MODERN PLASTICS

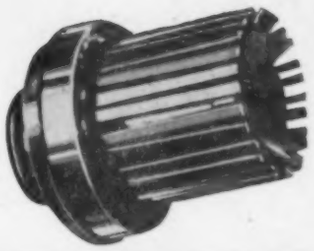
JULY 1948

CERTAIN plastics applications call for a given property, or a given combination of properties, in greater degree than is available in general-purpose materials. Because Durez plastics are chemically compounded phenolic materials, they permit structural manipulations which make them extremely *versatile*. These illustrations suggest how the simplicity and economy of molding with Durez are being extended to special applications.

Quite often a discussion between the design engineer, the molder, and the Durez field man has produced ideas that improve products, reduce costs, and add new sales appeal. Besides our long experience in helping to solve plastics problems, we offer you today the advantages of greatly increased output and perfected control of uniformity. If you'd like to see what other manufacturers are accomplishing with Durez, let us send you "Durez Plastics News" each month. Durez Plastics & Chemicals, Inc., 127 Walck Rd., North Tonawanda, N. Y. *Export Agents: Omni Products Corp., 460 Fourth Avenue, New York 16, New York.*

For UNUSUAL plastics problems Durez has

special properties



RAYON SPINNING

HARSH ACIDS

HOT COFFEE

STEAM VAPOR

RAYON SPINNING. Heart of the machine that manufactures synthetic rayon from viscose is this thread-advancing reel. Operating under continuous tension, the Durez reel is unaffected by water, acid, desulphurizing liquid, bleaching solution, oil, or heat. Reel's fingers retain satin-smooth finish after years of operation.

HARSH ACIDS. Molded of another special-property Durez, these acid pump impeller parts can be machined, sanded, buffed. Chemical resistance enables the parts to give long service without corrosion.

HOT COFFEE. Like the glass bowl of the Cory coffee brewer, heat-resistant Durez plastic cover is chemically inert to boiling water infused with coffee, leaves the beverage flavor uncontaminated. Easy to clean . . . cool to touch . . . attractively modern. Note other Durez parts.

STEAM VAPOR. Durez housing of the DeVilbiss Electric Steam Vaporizer is resistant to alcohol and chemicals in medicinal spray, as well as to heat. Additional properties of the compound . . . moisture resistance and self-insulation . . . are also useful here.

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

PHENOLIC PLASTICS THAT FIT THE JOB

"We've Been Using *Catalin* for Twenty Years... It's Our Best Handle Material"

This long term vote of Catalin-confidence came from principals of The Washburn Co. at the recent Housewares Show, Atlantic City. For years this company's famous lines of "Androck" ware have been almost exclusively Catalin-handled. Such sustained acceptance is proof of Catalin's *strongest* over-the-counter sales appeal – and to its *greatest* kitchen service advantages. Other leading manufacturers, too, are as enthusiastically outspoken.

Catalin is strong, heat resistant . . . will not soften to repeated washing . . . nor will it distort. It is odorless, tasteless, non-inflammable, smooth, pleasing to touch . . . never hot. Because of the thermosetting characteristics of Catalin, metal inserts become an integral part of the handle . . they never twist, slip or separate.

Tooling costs and production run costs are to the Catalin user's advantage. This holds good, whether applications are custom-cast or fabricated from stock shapes. A get-together with our service staff will prove helpful in adapting Catalin to your new product planning. Inquiries invited!

ANNOUNCING *"Cataloore"*

A Startling, New Surface and Sub-Surface Effect!

BOILING-WATER PROOF...CAN BE STERILIZED

Beyond the expression "unusual", a further word description of this new Catalin would be difficult . . . one must see it! Available in colors. Possesses exceptional strength and heat resistance properties. Opens a new world decoratively and industrially. Finished samples await manufacturer's request. Write today!

CATALIN CORPORATION OF AMERICA • ONE PARK AVENUE, NEW YORK 16, N.Y.

MODERN PLASTICS*

CONTENTS

GENERAL

PLASTICS ENGINEERING

TECHNICAL

DEPARTMENTS

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Hot air not needed

A new Geon latex film-forming at room temperatures

THE man has just dipped his finger into a new Geon water-borne resin known as Geon Latex 31X. It will dry on his finger, in the air, at ordinary room temperature, rapidly and evenly.

If you package foods or deal in fresh fruits and vegetables . . . or if you're looking for a better adhesive . . . or want to make a water paint with a water-impervious film that will dry at simple room temperature . . . or if you're dipping toys, gloves, packages, etc., where the form has a complicated shape and a thin flexible wall or covering is required—you'll want to know more about Geon Latex 31X.

The deposited film is flexible, but contains no plasticizer. It is odorless, resistant to grease, and has low moisture vapor transmission. It won't support a flame. Adheres readily to paper, wood, fiberglas, and textiles.

A distinct advance, a cost-cutter, a product-improver, you will agree—and we'll be glad to send our special bulletin giving complete details. We make no finished products from Geon Latex 31X or any of our other raw materials. We are interested, however, in any problems or special applications. For the special bulletin, please write to Department 0.7, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

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Another

HOUSING PROBLEM SOLVED

...with

CHICAGO MOLDED PLASTICS

It's a housing and dispenser for Bauer & Black's "Curity" adhesive tape... holds a standard 10-yard roll, 12" wide, cut into convenient widths. Keeps the tape clean and sanitary... puts it where it's handy for instant use. And that's a "must" in hospitals, first aid stations, and dispensaries.

To get a top-quality dispenser at a reasonable price was Bauer & Black's problem until they brought it to Chicago Molded. Then it became a development and production job for us.

There it is... injection molded of gleaming white polystyrene... white all through... and it stays white always... won't chip or peel. It's easily attached to the wall and the cover is designed so its weight keeps it either open or closed. Just a flick of the finger operates it. And... tho it looks and acts like a million dollars, it actually cost Bauer & Black about one-third as much as a comparable dispenser of metal with applied finish.

Development and production of molded plastics parts is our only business... and has been for more than a quarter century. That's one reason why the biggest names in industry select Chicago Molded as their primary source of supply. We have the experience, the knowledge, and the facilities to develop and produce your molded plastic part or product most efficiently and economically. When you're ready to discuss plans you'll find it worth while to call in a CMPC development Engineer. Just phone or write... there's no obligation.

CHICAGO MOLDED PRODUCTS CORPORATION

1046 N. Kolmar Ave. Chicago 51, Illinois

Representatives in principal industrial centers

COMPRESSION *and* INJECTION *molding of all plastic materials*

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EDITORIAL

Behind the Plastics Curtain

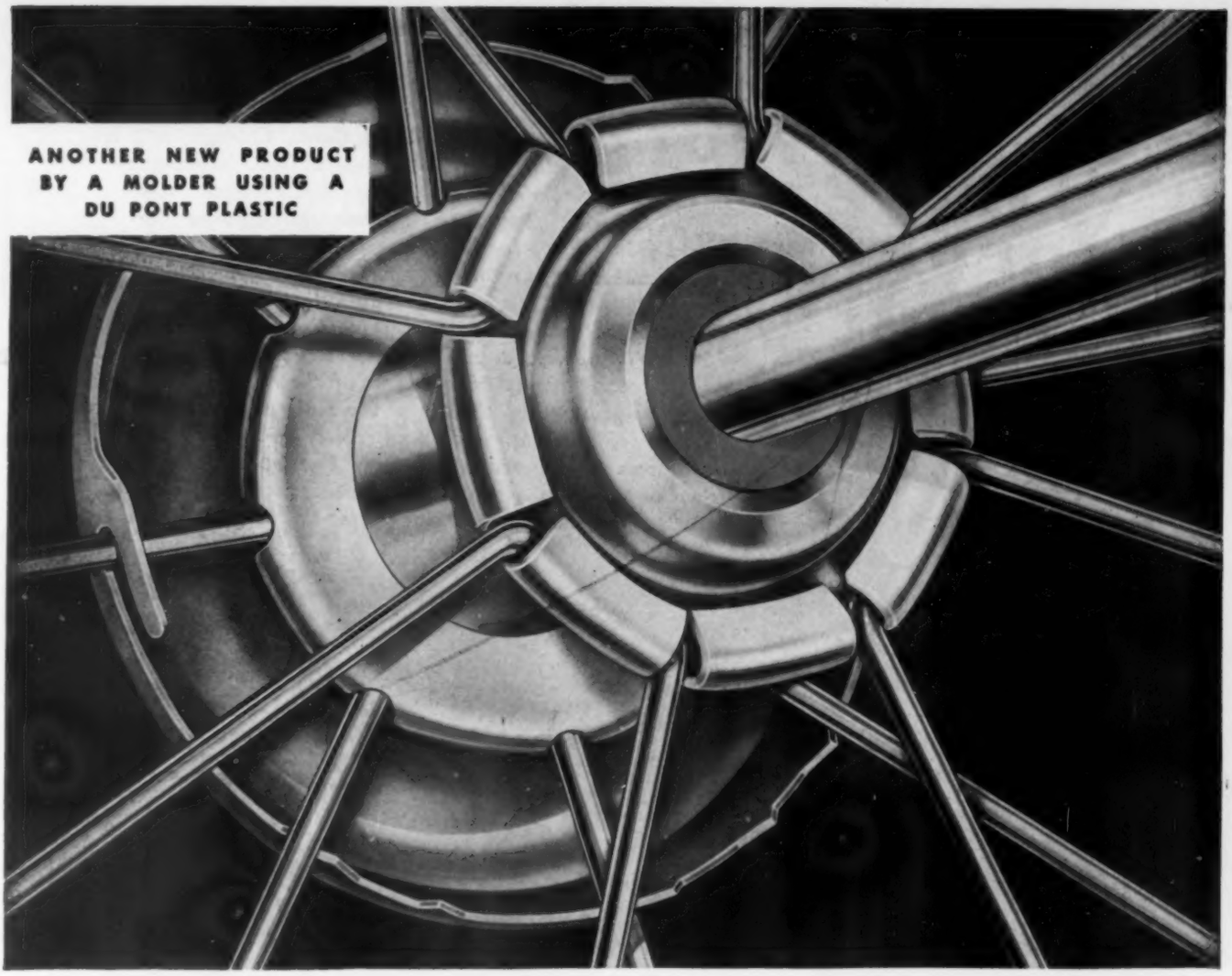
Activity in the brains section of the plastics industry is now showing signs of approaching the highest pinnacle ever achieved since Celluloid was invented. New materials, new applications, and new methods are under way or in process of development to such an extent that it is impossible for one mere human to keep thoroughly informed of them or to grasp the total significance of all the new stars that are beginning to glow in the plastics firmament.

An astonishing number of new raw materials are being readied for trial. Even more astonishing, from a practical viewpoint, are the finished products which are now on the market or soon will be there.

With relief from the pressure of war work and easement from the plaguing irritations of a short supply line, plastics companies are now in a position to exhibit the results of several years of work by their research and technical men. Not only new materials, but improvements in most of the old ones, are scheduled for early unveiling. Fluorinated and chlorinated plastics in ever-increasing variety are of tremendous significance; the search for a less costly acrylic and perhaps an extruded sheet shows promise of success; allyl, alkyl, and alkyd molding compounds are reported to be on trial in molding plants; high styrene copolymers in all sorts of variations are already contributing to the breadth of plastics applications; phenolic resins in new applications with wood and wood waste could add thousands of pounds to consumption figures; polyesters again show signs of looking up; silicones are more than ever in the public eye; glass and plastics in combination promise an almost unimaginable potential. These are only some of the better known possibilities.

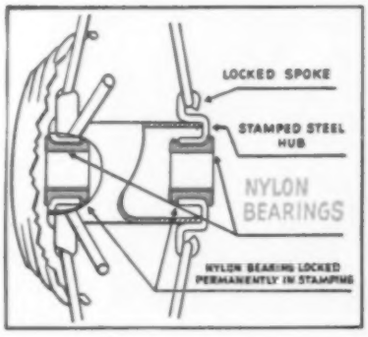
The same story can be told in plastics applications. Polystyrene vials are now reported to be available at less cost than glass; polyethylene stoppers are being produced at lower cost than the familiar wood-cork combination; phenolic paint brush handles are destined to take a great portion of the market; plastic printed circuits are revolutionizing certain phases of the electronics industry; plastics in battery cases seem certain to prove their utility; vinyl folding doors and saran window screens are becoming standard in the construction industry; plastics floor coverings and upholstery have passed the trial stage, and the latter has already reached big volume sales. The list goes on and on —is getting bigger and bigger.

Talk about a slump in the plastics industry! Brother, we're just beginning to roll!



NYLON PLASTIC CUTS RUB IN THE HUB

Bearing of Du Pont nylon needs no lubrication . . . rolls quietly



Need bearings in your business? Why not investigate Du Pont nylon plastic? Nylon is silent . . . no squeaking, and creaking. Nylon bearings won't chip, flake or powder . . . need no lubrication when loads are light and speeds are low. In the textile industry, for example, this means no oil spots on fabrics. Nylon has proved satisfactory for bearings with walls as thin as 1/16" . . . for bearings as large as 1¼" O. D. It may mean new profits for *you*.

Nylon's making news again—this time on the wheels of a baby carriage. In tests made on these wheels, bearings molded of tough, durable Du Pont nylon *actually lasted longer* than the metal axles. And they need no lubrication . . . withstand shocks and blows.

In other applications where loads are heavier, speeds are high, and lubricants are required, either oil or water can be used. Du Pont nylon plastic is not affected by oils and greases, chemicals and solvents . . . withstands service temperatures as high as 325°F. Nylon bearings show little or no deterioration with age. And injection molding permits rapid, large-scale production.

Is there a place for nylon in your business? You may profit with this and other Du Pont plastics . . . in developing a new product or improving an old one. Write now for literature. It will pay you to have it in your files. E. I. du Pont de Nemours & Co. (Inc.), Plastics Department, Room 367, Arlington, N. J.

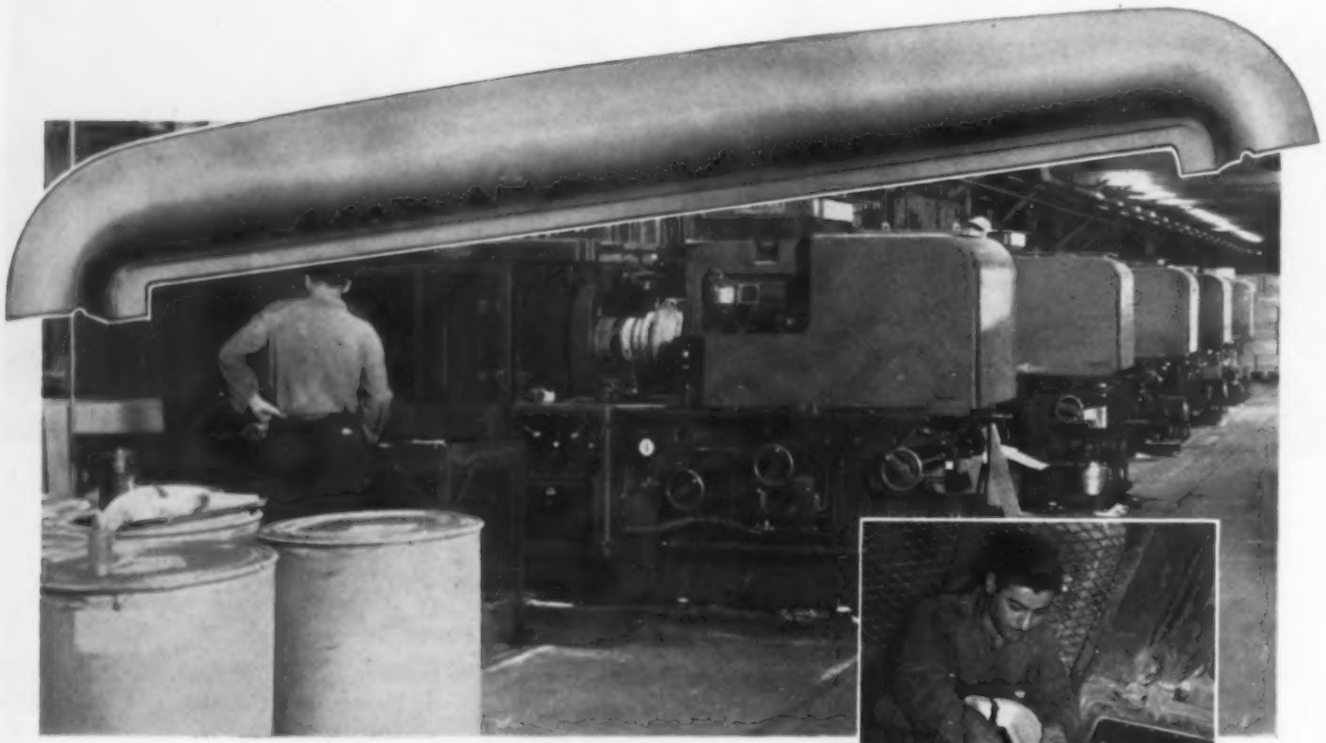
Baby carriages manufactured by Collier-Keyworth Co., Gardner, Mass.; nylon bearings molded by Nylon Bearings, Inc., Whitman, Mass.

Du Pont "CAVALCADE OF AMERICA" returns to the air Monday, September 13—NBC network.

DU PONT
REG. U.S. PAT. OFF.
Plastics
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

THE SUCCESSFUL COMBINATION

***Successful injection molders** need two primary requisites in order to compete in today's market . . . engineering skill and correct, up-to-the-minute equipment. In the Plastics Division of General American Transportation Corp., Chicago, Ill., is found this combination — skilled, experienced workmen and a battery of Reed-Prentice Plastic Injection Machines! **One outstanding job** (for Servel, Inc.) is the molding of refrigerator breaker strips up to 31" long, requiring uniformity in thickness, color and strength. Material must be heated accurately to prevent blemishes; pressure must be applied evenly to the material so that it will reach the furthermost parts of the mold and locking pressure of the die plates must be great enough to prevent flash and costly finishing operations. **General American Transportation Corporation** and other progressive molders select 24 Oz. Reed-Prentice machines for this large*



*cavity work because of these features — efficient heating; pressure on material up to 24,500 lbs. per sq. inch and locking pressure up to 600 tons. **All Reed-Prentice models** incorporate features that give you complete, accurate control over time, temperature and pressure . . . resulting in fine molded parts with an irreducible minimum of rejects. Write to Dept. D for complete information on 4, 8, 10, 12, 16 and 24 Oz. capacity machines.*

De-gating of the completed shot — the only finishing operation required.

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

INJECTION
REED-PRENTICE CORP.
WORCESTER MACHINES MASS., U.S.A.

CLEVELAND
1213 W. 3rd Street

NEW YORK
75 West Street

LOS ANGELES
2314 Santa Fe Ave.

People Like

to get their hands on

Lumarith*

A Celanese Plastic*

The manufacturer of the Dormeyer "Power Chef" employs two types of Lumarith in producing the point-of-contact parts for this popular kitchen mixer. It's an example of Lumarith's versatility. The power indicator guide is molded from a special *heat and flame resistant* Lumarith formulation, that scores high in form retention and dimensional stability . . . is the *right* plastic when electrical product parts need UL approval—plus rugged toughness. Molded by Industrial Plastics, Chicago, Illinois.

IT'S no coincidence that products and parts subject to constant handling are so often molded from Lumarith—Celanese' tough, satin-smooth cellulose acetate.

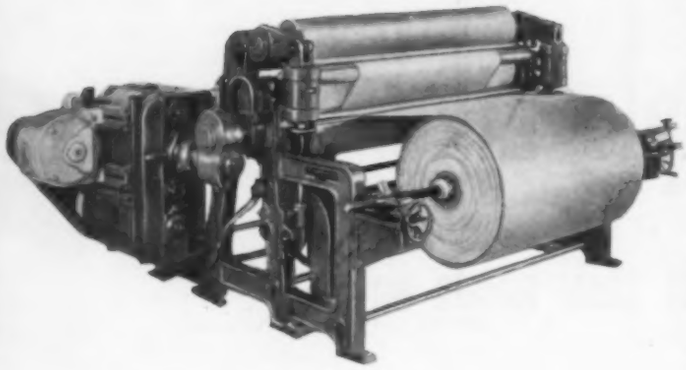
Lumarith's high insulation qualities—both thermal and electrical offer the utmost in touch-comfort and handling safety. Lumarith's wear-loving surface doesn't attract dust, and it actually grows more lustrous with handling. Lumarith's molded-in color holds its *new look* for the life of the product.

If you have a product that needs a *welcome touch* for consumer acceptance, get in touch with a Celanese representative. He can give you expert technical and practical advice.

CELANESE CORPORATION OF AMERICA
Plastics Division, Dept. D-1
180 Madison Avenue, New York 16, N. Y.

*Reg. U. S. Pat. Off.

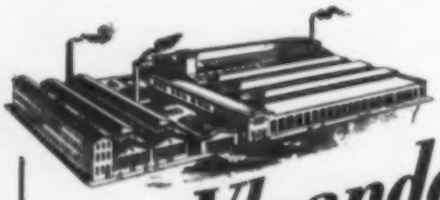
adapt this machine ⇨ to Impregnating Operations



Here's a machine that was developed by us for quetsch-pad impregnating operations in the textile industry. It can be utilized for impregnating synthetic fabrics, sheeting and film or as an impregnator in the assembly line production of low pressure, continuous laminates.

Like impregnating, there are many other operations basic to the processing of both textiles and synthetic fabrics. For many years we have manufactured a complete line of equipment for the textile industry. By checking over the full list of van Vlaanderen machines at the foot of this page, you may find the answer to one or more of the problems now confronting you in processing synthetic film, sheeting and fabrics.

Write now for information concerning the adaptability of these machines for your specific needs.



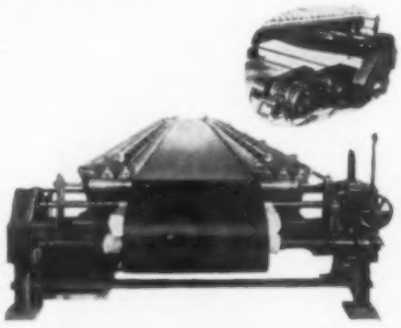
Van Vlaanderen

MACHINE COMPANY

370 Straight Street, Paterson, New Jersey

USE THESE STANDARD MACHINES FOR SYNTHETIC FABRICS

EXPANDER. Expanders are available in many different types for keeping rolls of material free of wrinkling. One or more expanders can be installed on practically all types of finishing machines to facilitate handling at take-up and let-off end of rolls.



TENTER FRAME. Tenter frames are available with or without heat units. These are excellent for stretching and orienting extruded, calendered or cast sheets or film. They can also be used on drying machines following coating operations.

BLEACHERS • BREAKERS • CALENDERS • CALENDER DRYERS CONTINUOUS WASHERS • COOLING CYLINDERS • COTTON BACK FINISHER DRYERS — ALL TYPES • DYEING MACHINES • ELECTRIC GUIDERS • EMBOSSING MACHINES • EXPANDERS • EXTRACTORS • FLOCK PRINTING MACHINES • GLASS CLOTH HANDLING EQUIPMENT • HEATING TOWERS • HYDRAULIC CALENDERS • IMPREGNATING MACHINES • MANGLES • MEASURING MACHINES • MIXING KETTLES • PAD DYEING MACHINES • PRINT WASHERS • ROLLING-UP MACHINES • ROLLS — RUBBER — PAPER • SINGEING MACHINES • SLACK PRINT WASHERS • SOAP WASHING MACHINES • SQUEEZERS • SUCTION MACHINES • TENSIONLESS CONSTANT SPEED DYE JIGS • TENTER FRAMES • TUBING MACHINES • WINDERS •

Fast Sellers for the Toy Trade . . . Molded from NIXON C/A

Dillon-Beck Manufacturing Company of Hillside, N. J., are smart merchandisers. They know that well-designed toys made of gleaming cellulose acetate with colors molded in have "kid-appeal" that keeps dime store cash registers busy. They are also smart manufacturers in selecting Nixon C/A (Cellulose Acetate) for molding their WANNATOYS. Whether it is a tiny concrete mixer or a doll's cooking set, the result is a colorful, durable product which looks better than its metal counterpart. Plastic toys look good and are good when molded from Nixon C/A. Perhaps you too have a place for Nixon plastics in your production set-up.

Nixon

C/N CELLULOSE NITRATE

C/A CELLULOSE ACETATE

E/C ETHYL CELLULOSE

Plastics

NIXON NITRATION WORKS • NIXON • NEW JERSEY

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FIBERGLAS*

...for sailboats with sales appeal

Here's a light, durable, seaworthy sailboat that offers a definite sales appeal to yachting enthusiasts. Its sleek, all-plastic, seamless hull eliminates the customary caulking and scraping chores.

The hull, mast socket and center-board trunk, and part of the deck are all formed from Fiberglas Mat and a thermosetting resin in one operation, at low pressure in a single, giant-size mold.

Fiberglas reinforcements are helping many designers and manufacturers produce laminated plastics products that are:

- *Light in weight and extremely tough.*
- *Resistant to corrosion and rust.*
- *Permanently colored: Eliminates original cost of surface finishing—no maintenance cost.*
- *Easy to fabricate: Can be formed with either high- or low-pressure laminating equipment—at minimum tooling cost.*
- *Economical: Fiberglas reinforcements are available, today, priced lower than most commonly used laminating reinforcing materials.*

For information on the properties, applications, economics and typical methods of fabricating products of plastics reinforced with Fiberglas Mats, Cloths and Fibers, write for a copy of "Fiberglas-Reinforced Plastics" Manual A9.3.1. Owens-Corning Fiberglas Corporation, Dept. 876, Toledo 1, Ohio. Branches from coast to coast.

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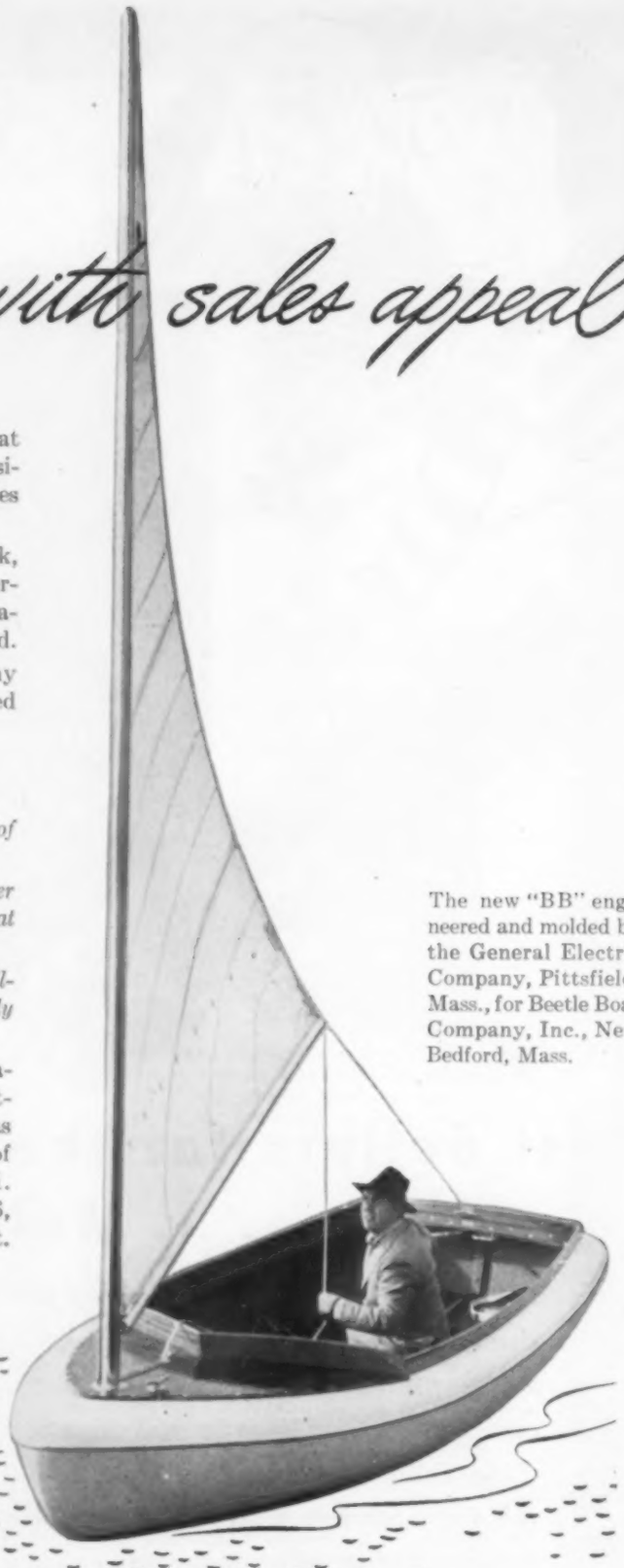


The new "BB" engineered and molded by the General Electric Company, Pittsfield, Mass., for Beetle Boat Company, Inc., New Bedford, Mass.

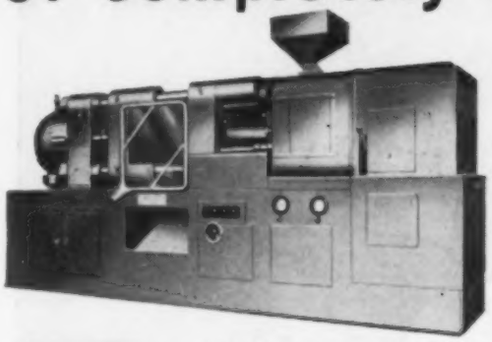
OWENS-CORNING

FIBERGLAS

PLASTICS REINFORCEMENTS

*Fiberglas is the trade mark (Reg. U. S. Pat. Off.) for a variety of products made of or with glass fibers by Owens-Corning Fiberglas Corporation.

The only "completeline" of completely Hydraulic Plastic Molding Equipment



HORIZONTAL MOLDING MACHINES

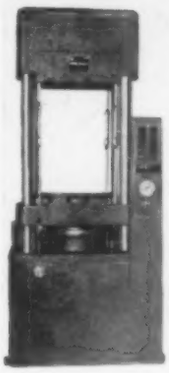
COMPRESSION MOLDING MACHINES

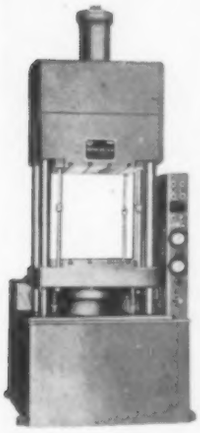
TABLETING MACHINES

TRANSFER MOLDING MACHINES

HOBBING PRESSES

WATSON-STILLMAN CO. ROSELLE N.J.





No matter what process — or what plastic material you use — Watson-Stillman can supply molding equipment to fit.

Horizontal Injection	8 to 80-oz.
Vertical Injection	1 to 4-oz.
Compression Molding	50 to 1200-ton
Tableting Machine	10 and 100-ton
Transfer Molding	30 to 1200-ton
Hobbing Presses	200 to 3000-ton

Ask Watson-Stillman's advice on selecting equipment or in solving any plastics molding problem.

4441

1848—CENTENNIAL—1948

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HYDRAULIC MACHINERY DIVISION

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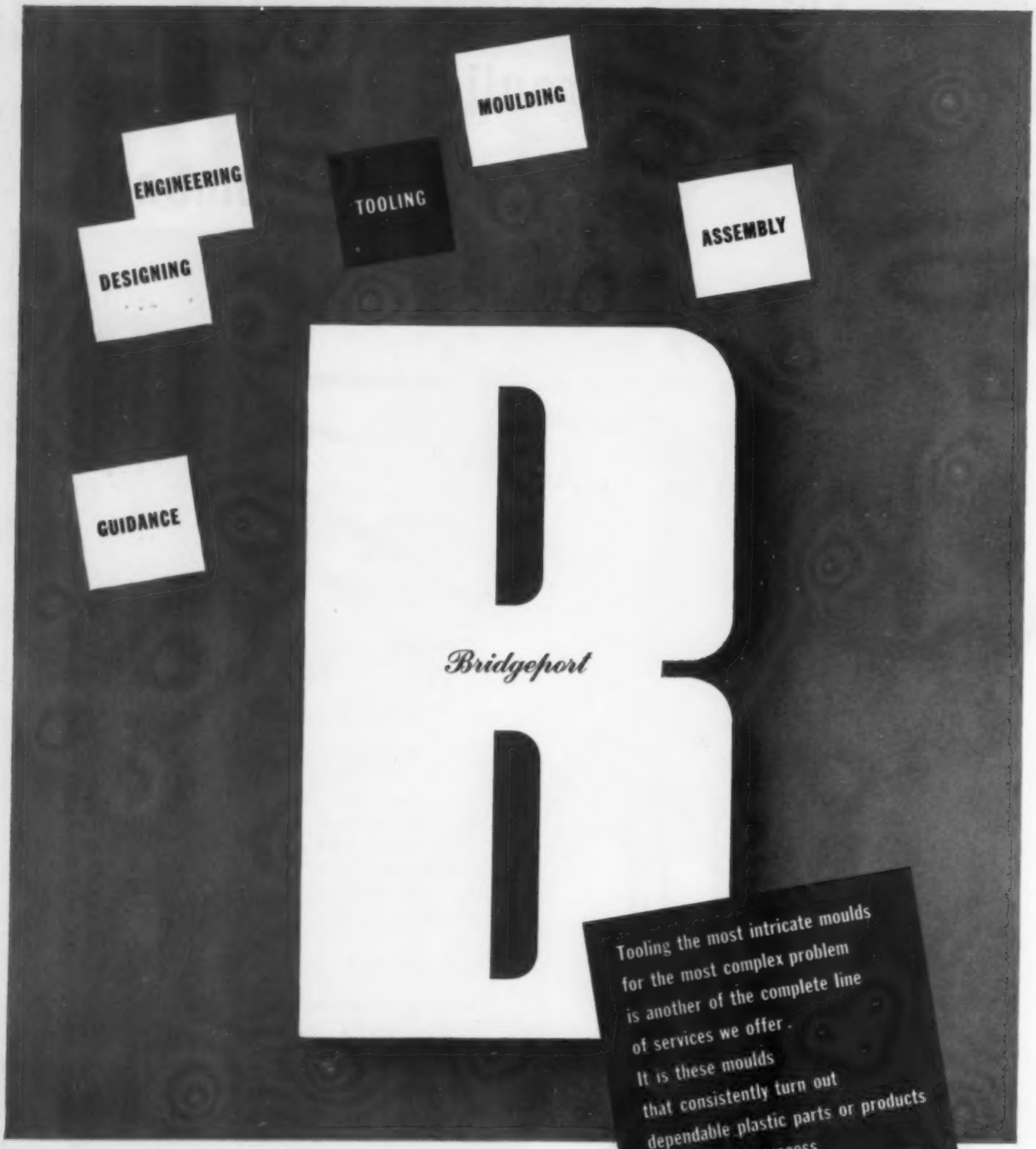
MANUFACTURERS OF THE MOST COMPLETE LINE OF HYDRAULIC MACHINERY



BRIDGEPORT MOULDED PRODUCTS, INCORPORATED

BRIDGEPORT CONNECTICUT

How to set up a pilot plant for plastics extrusions

The new, improved 1" NRM Bench Model extruder is specifically designed for laboratory operation. The unit provides an ideal method of making small quantity runs. Because its operating characteristics are so similar to standard NRM production extruders, it can well serve as a pilot plant.

Most of the new improvements that have been incorporated in the present line of NRM extruders, have been included in the improved bench model.

The unit is equipped with cartridge heaters for electric heating and will handle all thermoplastics up to 800°F extruding temperature. It is also available with a jacketed cylinder for steam heating.

Hundreds of firms are successfully using this little unit. Write today for complete specifications and operating data.

CHECK THESE IMPROVEMENTS

Xaloy-306 cylinder liner for greater wear and corrosion resistance.
Surface hardened screw flight lands for close tolerance production.
Equipped with either Chromalox thermostat or pyrometer type heat controls.
Electrically heated combination tubing die and wire insulating head, optional.
Screw speeds, 20 to 56 RPM, and 45 to 126 RPM.
Capacity 6 to 8 lbs. per hour depending on section size and type of material.

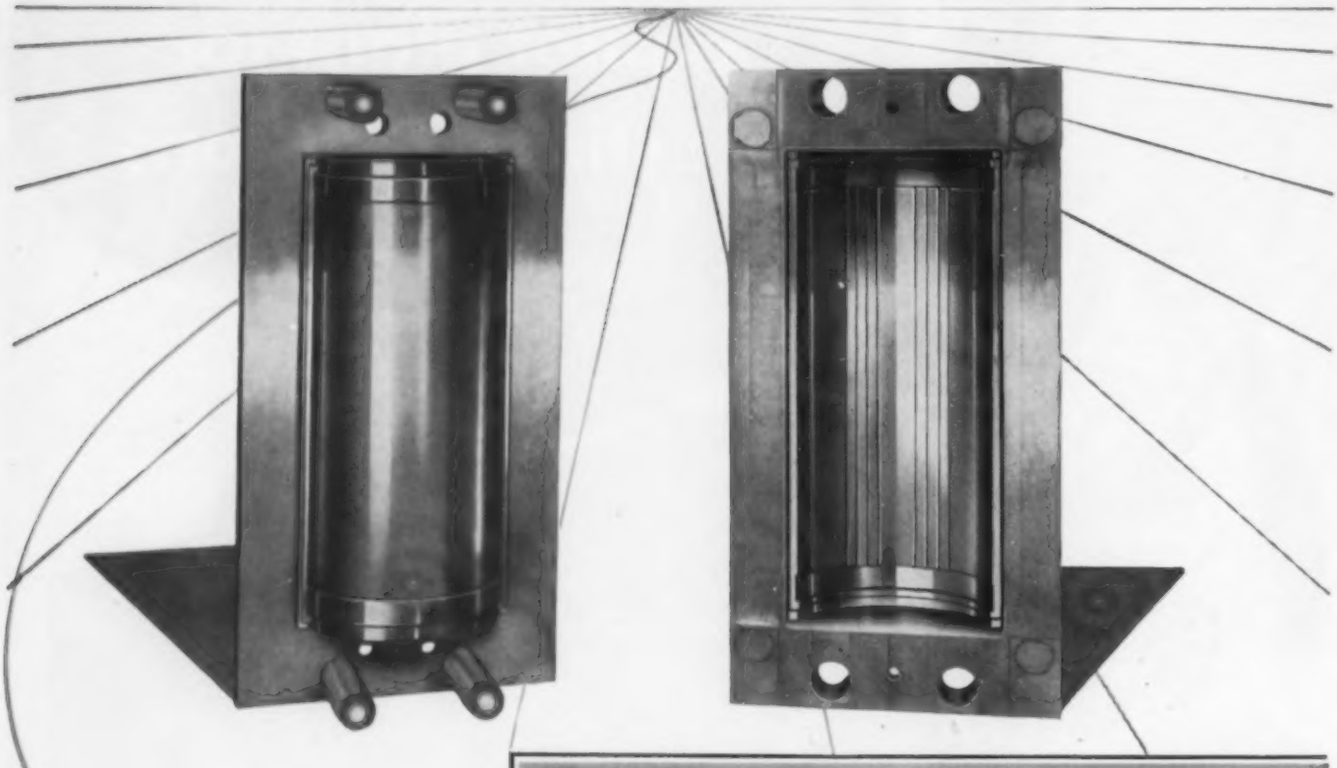
NRM

NATIONAL RUBBER MACHINERY CO.
General Offices: AKRON 8, OHIO
California Representative: Sam Kipp, P. O. Box 441, Pasadena 18, Calif.

Plastics MACHINERY DIVISION

EXPORT DISTRIBUTORS: OMNI PRODUCTS CORPORATION, 460 FOURTH AVE., NEW YORK 16, N. Y

Finish, Accuracy in Plastic Molds



SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS • SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM HEATED PLASTIC MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

ALLIED WITH MASS PRODUCTION

PLASTIC molds produced at Allied are machined to meet the most exacting requirements for accuracy of form. Finishing operations produce surface finishes which conform exactly to the molder's specifications, assuring the required quality appearance of every completed part. Whether your demands for molds are ordinary or unusual, we will be glad to submit quotations to you.

ALLIED PRODUCTS CORPORATION

DEPARTMENT 1-P

4622 LAWTON AVENUE DETROIT 8, MICHIGAN

ALLIED CORPORATION PRODUCTS — PRECISION · EXPERIENCE · DEPENDABILITY

Electric clock molded for Utility Plastics, Chicago

The right time for skillful molding

A glance at this electric clock will tell you much more than just the correct time. You will also see how effectively skillfully molded plastics are used to develop a novel idea. Elmer E. Mills Corporation engineers are constantly called upon to mold new ideas in plastics.

Whether our assignment is one of *product improvement* or *new idea*, we approach it with identical painstaking thoroughness. Will the product benefit from the use of plastics? If so, which plastic material will do the best job? Then careful engineering determines the best mold design and molding technique.

This devotion to detail has proved successful for our clients and us. You are assured of a fully satisfactory plastic product. We increase our reputation for molding craftsmanship that keeps clients with us for years.

Now is the right time to let us help you with *your* plastic problems. Consult us freely and without obligation.

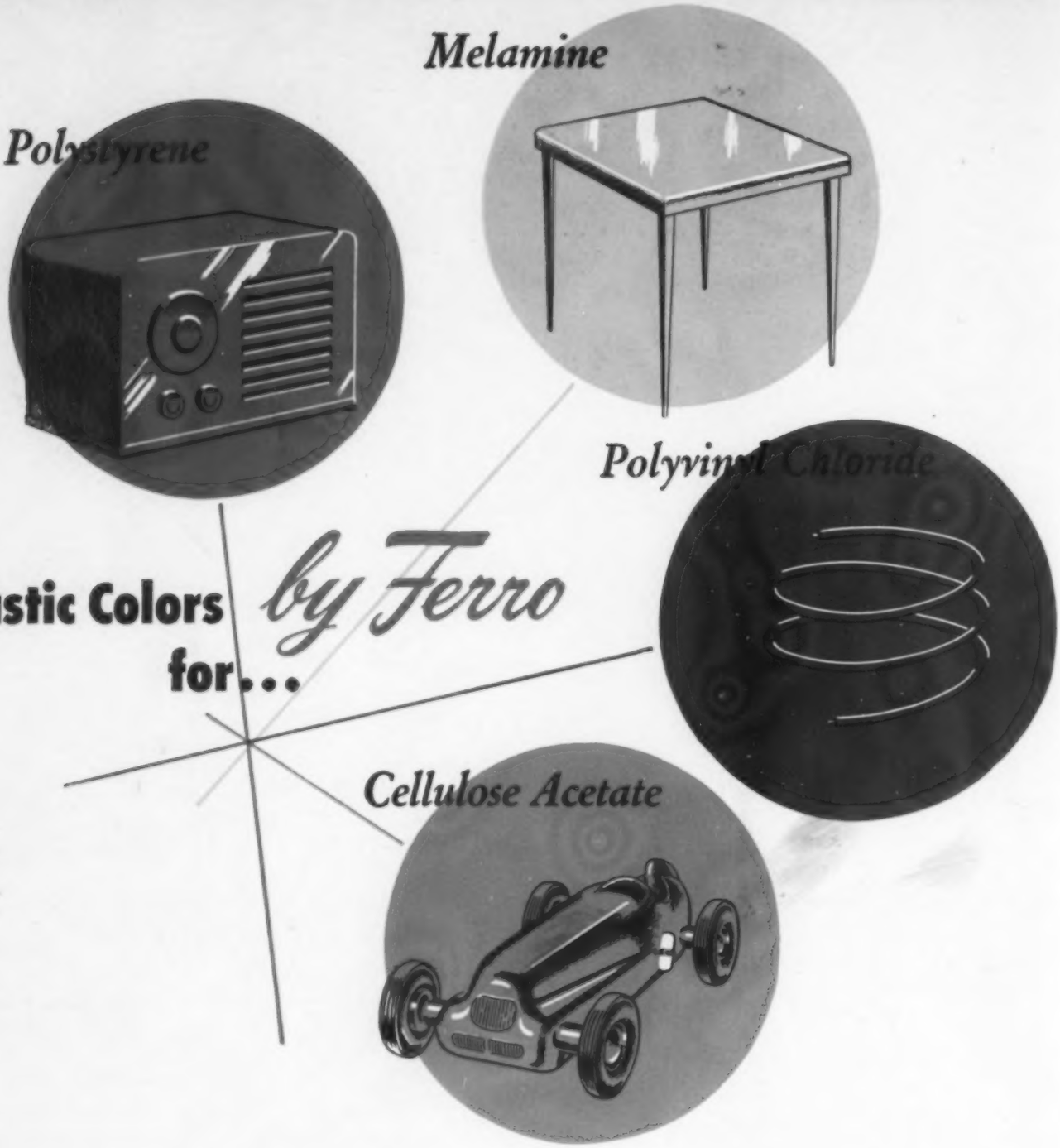
Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about [illegible], piping, tubing and fittings, write for circulars containing data and illustrations.*

**Trademark Reg.*

ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Fibestos, Lucite, Plexiglas, Nylon, Polystyrene, Styron, Lustron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Lustrex, Forticel, [illegible]*, Saran, and other Thermoplastic Materials.

153 WEST HURON STREET • CHICAGO 10, ILLINOIS



Plastic Colors for... *by Ferro*

Ferro's newly developed inorganic colors offer an unusual combination of desired color properties for injection, extrusion and compression molded plastics.

For example, Ferro colors (red, yellow, blue, green, brown and black) are highly stable in temperatures up to 2300° F. They are easy to work and have an unusually low bulking value. Electrical and chemical-resistant, these uniform colors are also light-fast . . . unaffected by weather extremes . . . nonbleeding and nonmigrating in chemical neutral plastics.

If you, as a producer of plastics or as a manufacturer of plastic products, are not satisfied with your present colors—we suggest you explore the possibilities of these newly developed inorganic colors by Ferro. Complete information will be gladly furnished on request.

FERRO enamel corporation • COLOR DIVISION

4150 East 56th Street • Cleveland 5, Ohio

The Improved
VAN DORN Plastic Press

1. *Spreader* added to heating cylinder cuts heating cycles up to 50%.
2. *Hard Chrome Plating* of interior of cylinder cuts resistance to flow of materials, protects against corrosive compounds.
3. *New Relief Valve*—set at 1500 P.S.I.—insures maximum clamping pressure always, permits *separate* adjustment of injection pressure.
4. *New Needle Valve* increases gage life, by allowing gage to be shut off except for periodic checks on pressure.

★ ★ ★

With the addition of these four new features, this Van Dorn Press is *unequalled* in the 1 oz.-capacity class for molding practically all thermoplastics including nylon. This remarkably economical press—

Costs under $2000

Operates 8 hours for under a dollar

Uses less expensive molds

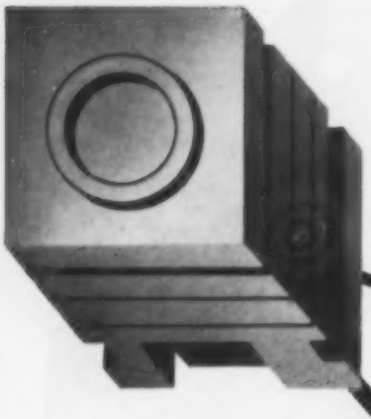
Can be set up by one man in 20 minutes

This Van Dorn Injection Press is unexcelled for profitable production of small parts, and "pilot" or experimental runs on bigger jobs.

We make mold bases for Van Dorn Presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO

FREE BULLETIN
tells all the facts.
Write for it.

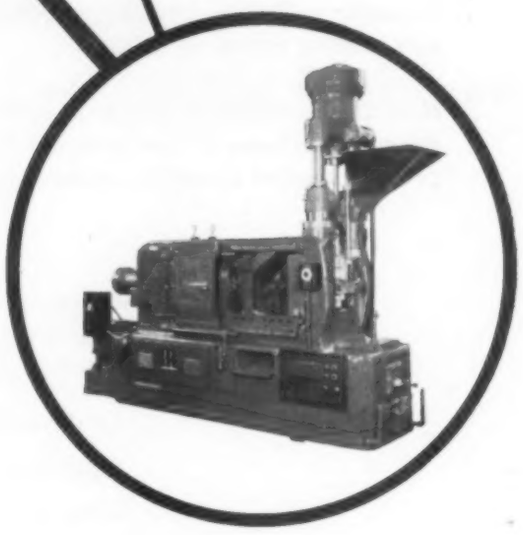


WE'LL PROVE

YOUR MOLDS

GET BETTER RESULTS

ON A LESTER



Every man tends to question the claims of advertising—unless these claims are proven before his eyes. LESTER-PHOENIX STANDS READY TO PROVE THE EFFICIENCY OF LESTER INJECTION MOLDING MACHINES! We invite you to send your molds to our Cleveland plant for testing. There you will be shown the unequaled performance of the Lester. Furthermore, you will have the expert advice of the leaders of the plastics industry on the most effective methods of obtaining the maximum production of your item. Write today and we shall schedule the testing of your molds.

REPRESENTATIVES

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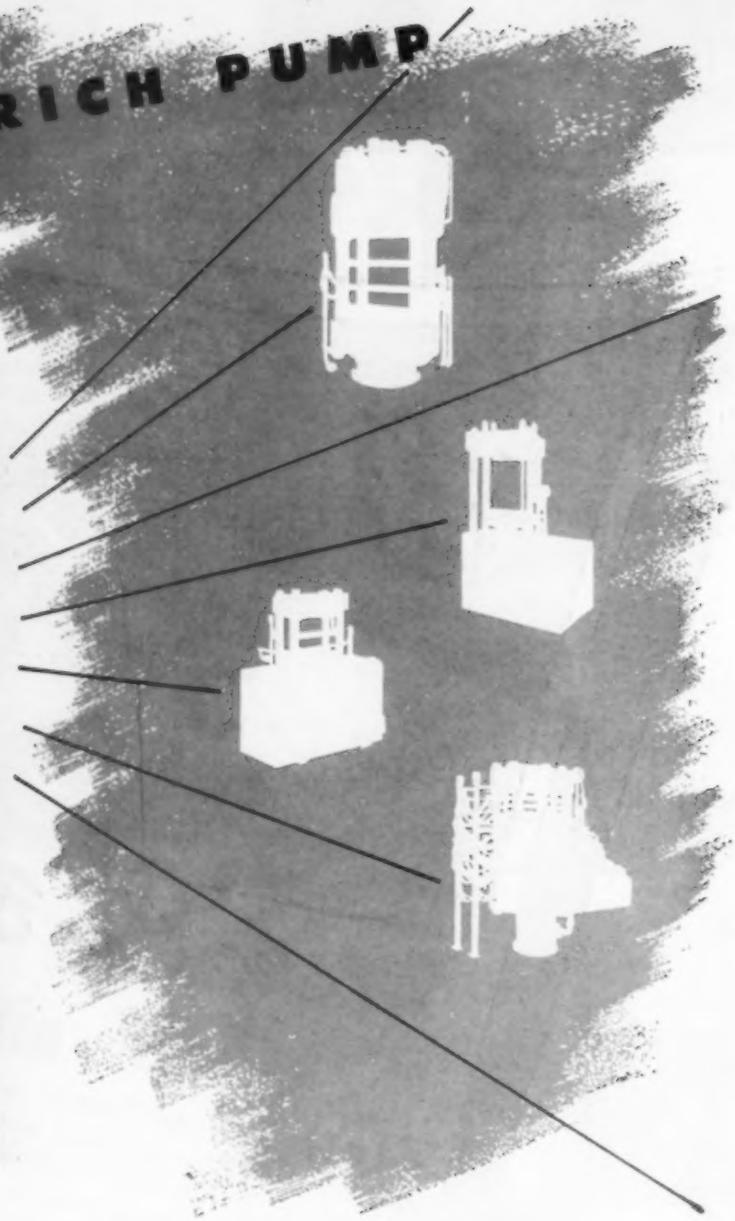
LESTER INJECTION MOLDING MACHINES

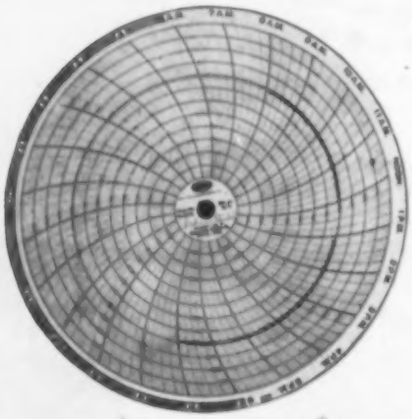
Distributed by LESTER-PHOENIX, INC.

2621 CHURCH AVENUE **CLEVELAND, OHIO**

USE *One* ALDRICH PUMP



For All Your Plastic Molding Presses



With one ALDRICH-GROFF "POWR-SAVR" PUMP, you can provide uniform hydraulic pressures for all your plastic molding presses and obtain the higher efficiency of a centralized hydraulic system at the same time.

The ALDRICH-GROFF "POWR-SAVR", a variable stroke, constant speed, variable capacity pump, will handle any free-flowing liquid—can be automatically controlled to provide stepless, straight-line variation from zero to rated maximum output. Working pressures up to 15,000 psi can be maintained and variance will not exceed 5% of that desired.

Centralize your system—you get compactness, quick accessibility, easy maintenance and greater economy. Write for technical details to—

THE ALDRICH PUMP COMPANY

6 GORDON STREET, ALLENTOWN, PA.

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ALDRICH, THE FIRST NAME IN VARIABLE CAPACITY PUMPS

Better PRODUCTS AT Less COST . . .

In the manufacture of industrial equipment . . . automobiles . . . radios and television . . . home appliances—in numerous industries of every type, plastic parts molded by Plastic Research Products are now specified over other materials because of proven use and cost advantages.

Shown below are two typical examples of P R P's production of *better* parts at *less* cost for another important industry—aviation. In changing from metal to plastics, the user of both of these parts is benefiting from P R P's wide experience in serving every type of industry, its modern plant facilities, its diversified equipment, its ability to PRODUCE and make delivery as scheduled.

Whatever your current or contemplated use of plastics, make your first objectives the production of *better* products at *less* cost. We'll be glad to supply details of our experience in your particular field. Write today.

Plastic Research Products Company

Factory and Office, URBANA, OHIO

Branch Offices: 551 Park Avenue West, MANSFIELD, OHIO
National Bank Building, LOGANSPORT, IND.

PRP

PLASTICS RESEARCH PRODUCTS

COMPRESSION, TRANSFER, HIGH SPEED AND AUTOMATIC MACHINE MOLDING

Adding new sales appeal to the famous Coolerator Refrigerator is a sturdy plastic drip pan only ⅛ the weight of the old style glass drip pan. Designed by General American to avoid cracking and chipping and to withstand hot water washings as easily as cold water drippings, this drip pan enhances the beauty and efficiency of the Coolerator.

Using a cycle, General American overcame the problem of warpage often found in molding products of so large an area. The dies were made in General American's own shops. The drip pan was molded on 22 oz. injection presses.

This same specialized service can be yours. Your plastics part or product will be planned, designed and produced for maximum efficiency and sales appeal by General American's expert designers and engineers. Dies made with General American's own modern die-making equipment, and high speed molding machines — 2 to 32 oz. injection presses and 100 to 2000 ton compression presses—will turn out your plastics part or product *on schedule!* Write or send blueprint for quotations and suggestions. No obligation, of course.

PLASTICS DIVISION

GENERAL AMERICAN TRANSPORTATION CORPORATION 135 South LaSalle Street Chicago 90, Illinois

New York - 10 East 49th Street • Los Angeles - Richfield Building

PROVED!

...for fast, accurate molding!

-the new DeMattia Injection Presses

The fact that DeMATTIA Molding Presses and Molding Equipment are specified year after year, by molders throughout the world is proof of their dependability. One sure way to better plastic production is the specification of DeMATTIA machines and DeMATTIA molds in your plant.

Rugged Hydraulic Horizontal Press—

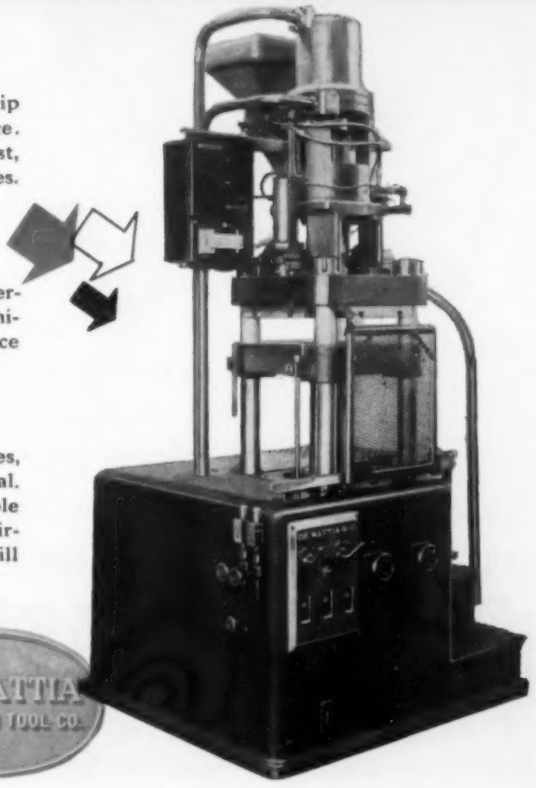
An efficient DeMATTIA press featuring proper design, finest workmanship and materials and built to function smoothly in heavy, continuous service. Solid base and tension members, open feed for visual inspection and fast, contamination-free color changing are only a few of the many advantages. Available in 6, 12 and 24 ounce capacities.

New Vertical Injection Press—

Suitable for general injection molding, the DeMATTIA Vertical Type performs excellently on exacting insert work. Compact design requires a minimum of floor space in the molding plant. Furnished in 4 and 12 ounce capacities. Complete data and specifications sent promptly on request.

DeMattia Complete Molding Equipment—

DeMATTIA Machines for the molding industry include injection presses, scrap granulators and cutters for quick handling of even large scrap material. DeMATTIA scrap grinders make it possible for molders to save valuable storage space and eliminate costly processing charges. For the molder requiring assistance on design, DeMATTIA will plan and make molds that will help assure successful molding. WRITE FOR ILLUSTRATED LITERATURE.



DE MATTIA MACHINE and TOOL CO., CLIFTON, NEW JERSEY

New York Sales Office: 50 Church St. • Cable Address: Bromach, N. Y.

VISIBILITY SELLS MORE ICE CREAM!

The transparent lids for the Savage Arms ice cream cabinet pictured above were injection molded in three parts (see inset diagram) by Prolon Plastics. When the parts are bonded together each lid provides two hermetically sealed air spaces for insulation and as a precaution against fogging. Heavy section injection moldings, such as this, are a specialty with Prolon Plastics where careful planning, plus scientific production control, help you get more for your money.

FOR BETTER QUALITY, BETTER SERVICE, WRITE TO

PROLON PLASTICS

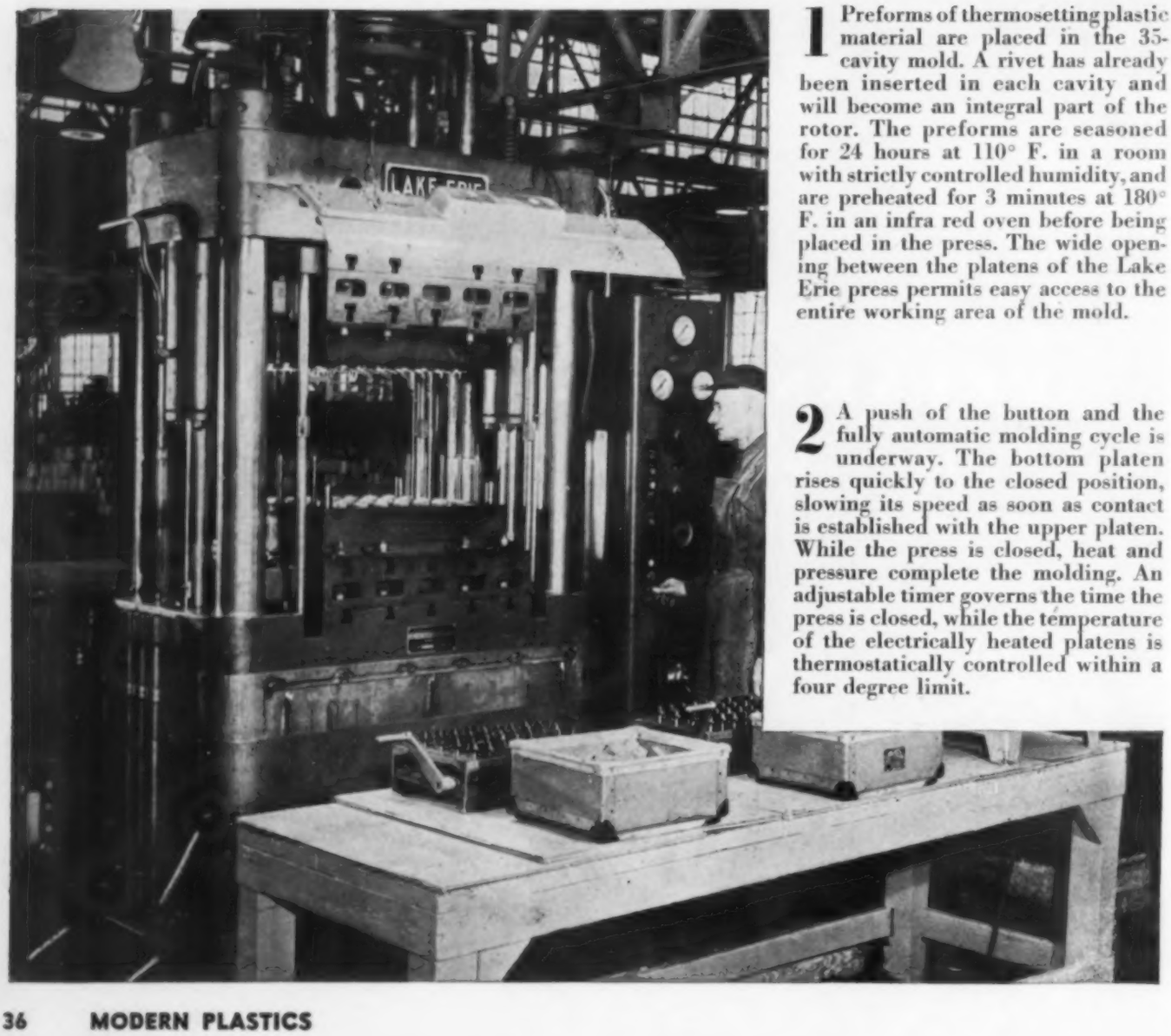
A DIVISION OF

PRO-PHY-LAC-TIC BRUSH CO., FLORENCE, MASS.

RESEARCH ★ DEVELOPMENT
DIE-MAKING ★ COMPRESSION
AND INJECTION MOLDING

How the Ford Motor Company

Rotors are turned out at the rate of more than 150 per hour on this 300-ton automatic Lake Erie Hydraulic Press at the Rouge Plant.



1 Preforms of thermosetting plastic material are placed in the 35-cavity mold. A rivet has already been inserted in each cavity and will become an integral part of the rotor. The preforms are seasoned for 24 hours at 110° F. in a room with strictly controlled humidity, and are preheated for 3 minutes at 180° F. in an infra red oven before being placed in the press. The wide opening between the platens of the Lake Erie press permits easy access to the entire working area of the mold.

2 A push of the button and the fully automatic molding cycle is underway. The bottom platen rises quickly to the closed position, slowing its speed as soon as contact is established with the upper platen. While the press is closed, heat and pressure complete the molding. An adjustable timer governs the time the press is closed, while the temperature of the electrically heated platens is thermostatically controlled within a four degree limit.

produces Distributor Rotors...

3 When the molding cycle is completed—the press is closed for 5 minutes at 300° F.—the Lake Erie Press automatically opens to its full width. The operator then removes the molded rotors and flash or excess material. Within 2 minutes after the molded rotors are removed from the Lake Erie press, they are placed in the ingenious cooling fixture shown in 4.

4 The rods on which the rotors are being mounted are exact duplicates of the rods on which the rotors will be assembled in the distributor. In cooling to room temperature, the rotors shrink onto the rods and are held to within 2/10,000 of an inch of the exact fit required for installation in the Ford engine. A turn of the crank strips the cooled rotors from the rods.

Various stages in the manufacture of Ford rotors. At the left is the preform of thermosetting plastic material and the rivet which is integrally molded in the rotor. Next is the molded rotor with steel spring and brass tongue ready for assembly. At the right is the completed rotor. The pencil gives an idea of the small size of the parts and the need for precision presses and molds in manufacturing this vital Ford part.

● *Lake Erie Hydraulic Molding Presses, Laboratory and Test Presses are fully illustrated and described in Bulletin 544. Write for a copy today.*

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF HYDRAULIC PRESSES AND SPECIAL MACHINERY

General Offices and Plant:
868 Woodward Ave., Buffalo 17, N.Y.

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COMMON SENSE ASSEMBLY ENGINEERING

Puts the Heat on Needless Tapping

"Previous experiences with P-K Self-tapping Screws in both sheet metal and plastic indicated such obvious savings that no other method was considered in the original design," says **Monitor Equipment Corporation,** producer of this automatic "pop-up" electric toaster.

It was estimated that by eliminating the cost of tapping alone, each P-K Screw used saved about ¼¢. Add to this the speed-up of assembly made possible, consider the spoilage avoided, and the savings on thousands of toasters produced mount rapidly to important figures. No wonder Monitor has found it's just common sense to use P-K, *the original* self-tapping screws.

Profit by the experience of the many manufacturers who have switched to P-K and saved up to 50% in assembly work hours. Why use costly, time consuming tapping, riveting, nut-running or mold-slowing inserts in plastic? Besides saving time, the simpler P-K method often makes possible a stronger, better-designed product.

Ask a P-K Assembly Engineer to examine your assembly and show how the simpler P-K method can save for you. Or, mail assembly details for recommendations. Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

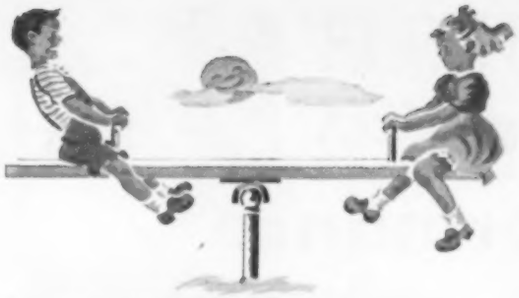
Sold Only Through Accredited Distributors

P-K® The Original

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

PARKER-KALON SELF-TAPPING SCREWS

OTHER PARKER-KALON PRODUCTS COLD-FORGED SOCKET SCREWS • HARDENED SCREWNAILS AND MASONRY NAILS • SHUR-GRIP FILE AND SOLDER IRON HANDLES • METAL PUNCHES • DAMPER REGULATORS AND ACCESSORIES



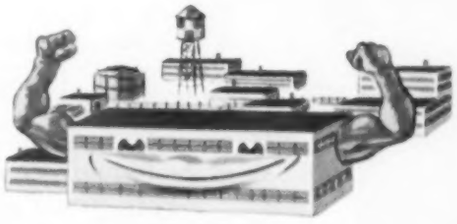
Greater Stability! A polyvinyl chloride-type resin of high molecular weight, Marvinol offers superior resistance to heat, light and other normally destructive factors.

MARVINOL® the new VINYL RESIN gives you all these advantages

Broad Temperature Range! Products made from Marvinol resins show less heat deformation than other resins . . . offer positive advantages in low temperature flexibility.

Unique Versatility! Easy to process, Marvinol resins may be calendered, extruded, injection molded, used in non-aqueous dispersions, formulated as unplasticized rigids.

Close Cooperation! No division of The Glenn L. Martin Company compounds or fabricates in the plastics field. Let our sales engineers and modern customer service laboratory help solve your processing problems. Write on your company letterhead to: Chemicals Division, The Glenn L. Martin Company, Baltimore 3, Md.



Ultra-Modern Plant! New Marvinol plant contains latest equipment to assure efficient operation, uniform product, highest quality. Production quantities of Marvinol resins are now available.

Other Advantages to Cheer About! Can give crystal-clear transparency, brilliant or delicate colors... unusual "dryness" . . . exceptional toughness and long life . . . may be tasteless, odorless . . . easily, quickly cleaned.

Martin® Marvinol

RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF
THE GLENN L. MARTIN COMPANY • AN INTERNATIONAL INSTITUTION
"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN"

Molded and Tested for Performance

This crystal clear Polystyrene tray for G. E. refrigerators can hide no flaw in appearance, or warp or distort under conditions of high temperature and humidity. Only severe tests could prove its all-around qualifications for duty.

by Erie Resistor

Nothing is taken for granted in the plastic product which you get from Erie Resistor. Appearance is not enough. The visual test which says, "It looks all right," is the beginning and not the end . . . any molding which must withstand unusual conditions in use must stand superlatively unusual conditions in the testing laboratory.

This large flat refrigerator tray, for instance, had to prove its ability to resist warpage at any possible temperature to which it would be subjected. It also had to serve a "5 day term" in the humidity cabinet shown at left, 100% relative humidity at 110° F, to prove its non-absorbent qualities.

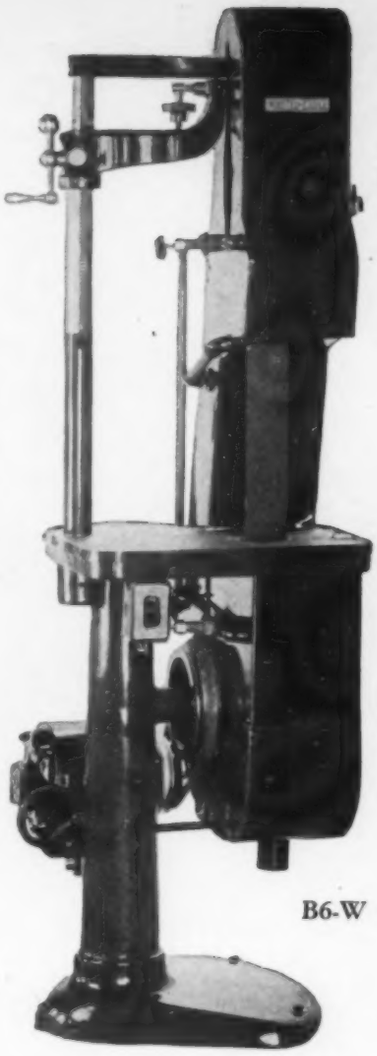
There is no guesswork about the plastic product that is molded by Erie Resistor . . . it's molded to perform the function for which it was planned.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND · · TORONTO, CANADA

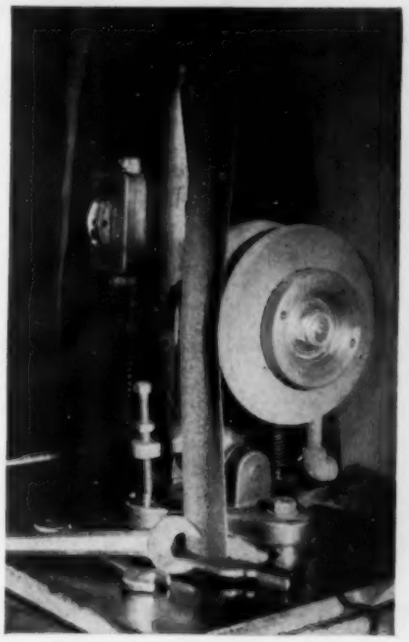
FLEXIBLE WET BELT . . .
Makes Clean-up Faster & Cleaner



B6-W

Porter-Cable Abrasive BELT SURFACERS

Quickly adaptable to different shapes
Grinds contours and curved surfaces



Close-up of B6-W at work

As the cost of labor and materials steadily increases, it's a tough job to keep your product within competitive range. But you can do it.

Begin by tackling expensive clean-up operations . . . with Porter-Cable Belt Surfacers (either wet or dry belt). You'll marvel at the time savings over hand or "gadget" methods.

Porter-Cable Belt Surfacers are proved plastic shop equipment. They remove gates . . . parting lines . . . flashings. Finish rough spots . . . smooth out molded effects and deep surface scratches. Operate equally well on thermoplastics or thermosetting plastics.

WG-4

Notice in illustration above how the flexible belt follows the contour of ordinary metal pulley used as platen — an attachment that makes finishing of irregular shapes easy.

GET FEWER REJECTS

In addition to doing better work *the first time*, Porter-Cable reduces flow, discoloration, burning and abrasive loading—and does not leave tool marks.

The WG-4 does flat grinding on platen and line-contact grinding on resilient contact roll. Has self-contained coolant system and re-circulating tank. Drawer traps grinding waste. Tilted head for free use of contact roll and full use of coolant on belt.

FREE SERVICES . . .

Let us prove that Wet Belt Machining can reduce the cost of many of your operations. Send us samples for recommendations . . . or ask to have our engineers discuss your problems at your convenience . . . at your own plant. Also, send for film on Wet Belt Machining Methods—"Machine of the Age"—loaned *free*.

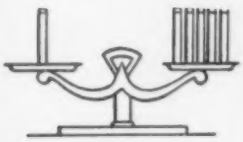
PORTER-CABLE
MACHINE COMPANY

1606-7 N. SALINA ST. SYRACUSE 8, N. Y.

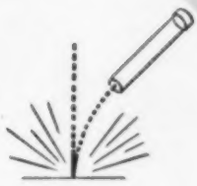

A-1
Bit & Tool Company
A-1 SIDEWALL CORE
NEW
the first CLEARSITE* vials in featherweight,
non-shattering LUSTRON

NEW

Here's the very latest in plastic containers! Molded in Lustron, these all-new vials and containers by Celluplastic Corp. take full advantage of the unique properties of Monsanto's famous polystyrene:



70% LIGHTER THAN GLASS CONTAINERS

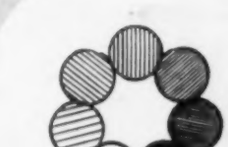


NON-SHATTERING, SEAMLESS, SAFE

NO TASTE, NO ODOR

ROUND, SQUARE, OVAL—
OTHER SPECIAL SHAPES

ALL CLOSURES: SCREW, PLUG, FRICTION



ALL COLORS: SPARKLING CRYSTAL CLEAR,
GEM-LIKE COLORS, TRANSPARENT,
OPAQUE AND MOTTLE

UNIFORMITY: DIMENSIONAL STABILITY,
FLAT NON-ROCKING BASE

RESISTANCE TO ACIDS, ALKALIES,
MOISTURE

IMPRINTED IN PROCESS OF MANUFACTURE
IN MULTI-COLORS

These new vials will be used by the millions for efficient packaging of drugs, cosmetics, pharmaceuticals, foods, confections, condiments, novelties, machine parts, etc.

In savings in shipping weight, bulk packing, and breakage, these new containers will pay their own way from the start, package engineers point out. Production men like Clearsite's uniformity for fast, uninterrupted line production. Sales managers point out the extra plus factors of transparency, color and safety. For full information on these vials address Celluplastic Corporation, 50 Avenue L, Newark 5, N. J. For full information on Lustron for your business, use the coupon at right.

*Reg. U. S. Pat. Off. by Celluplastic Corporation. Lustron: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

MONSANTO CHEMICAL CO., PLASTICS DIV.,
DEPT. MPLP7, SPRINGFIELD 2, MASS.

Please send me more information about Lustron for my business.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Impco Display Stops Thousands

Through the cooperation of the New Hampshire State Planning and Development Commission we were privileged to install the display shown above in the North Station in Boston. An Impco VF Injection-Compression Molding Machine is shown in the background.

MANY hundreds of users and buyers of plastic articles stopped to examine the objects shown in the Impco display above. They were intrigued by the variety and beauty of the objects that ranged from small, intricate parts to large toilet seats—all molded on Impco machines.

Many inquiries were received from molders. These men were interested in the techniques and machines used in producing certain parts.

If you have a molding problem—whether of an unusual nature or for straight production—let us help you solve it. Send us a brief outline, let us send a representative or come to Nashua and talk it over.

PLASTIC MOLDING MACHINERY DIVISION

Improved Paper Machinery Corporation

Nashua, New Hampshire MP-15

Impco

- Injection-Compression
- Straight Injection
- Compression
- Transfer

MOLDING MACHINES

Ratio of resin to plasticizer	Ratio of resins to plasticizer "FLEXOL" R-1 4-1	"FLEXOL" R-1 2-1	"FLEXOL" TWS 4-1	"FLEXOL" TWS 2-1
VINYLITE resin VYNW	C	C	C	C
VINYLITE resin AYAF	C	C	C	C
Geon resin 101	C	C	C	C
½ sec. Nitrocellulose	C	C	C	C
Ethyl cellulose	C	C	C	I
Cellulose acetate	I	I	I	I

C—Compatible I—Incompatible

2 NEW "FLEXOL" PLASTICIZERS — to give your products the edge!

Here are the eighth and ninth members of the growing group of FLEXOL plasticizers. These new plasticizers will allow even wider scope to give your products a competitive "edge." They are designed to meet the general requirements of compatibility and non-volatility. In addition, their special properties are such that your investigation is warranted.

Write or call our nearest office for technical data on these and other plasticizers we supply — when writing please address Dept. L-7.

CARBIDE and CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

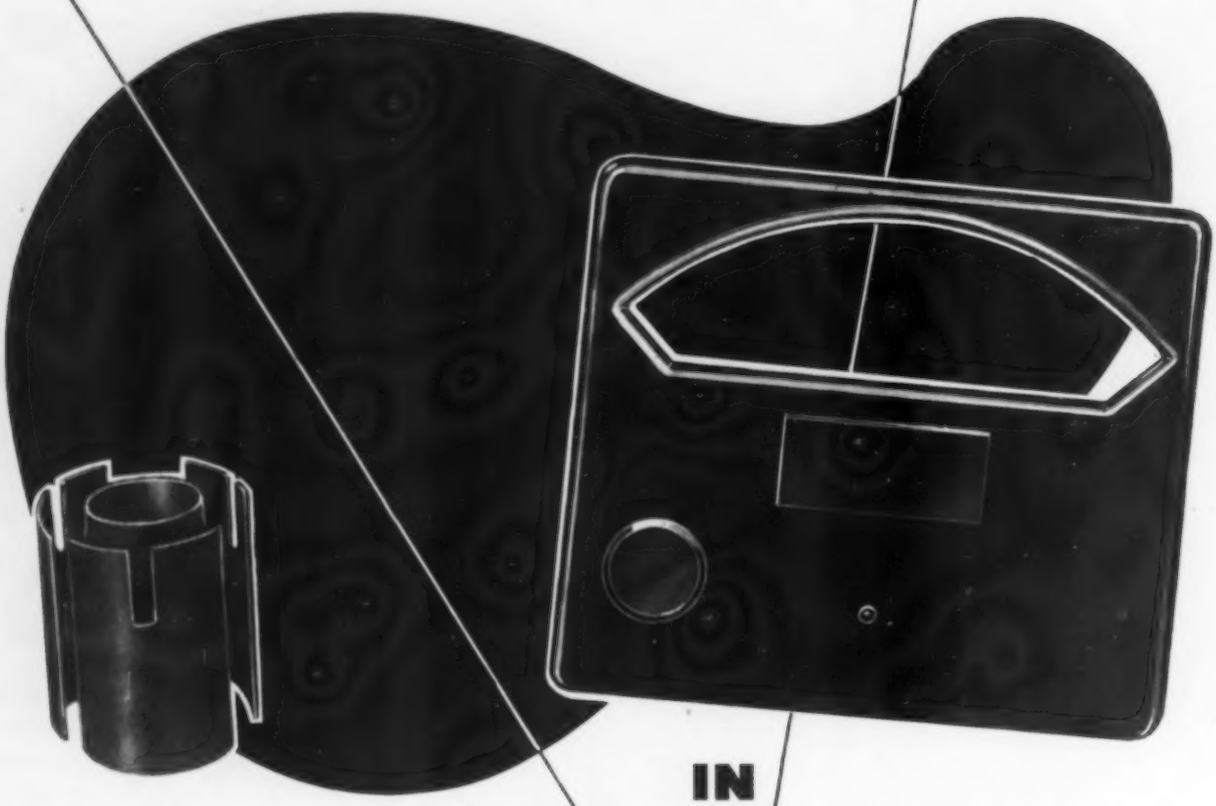
Offices in Principal Cities

In Canada:

Carbide and Carbon Chemicals, Limited, Toronto

The words "Flexol" and "Vinylite" are trade-marks of C.&C.C.C.

SUCCESS STORY



IN TWO PARTS

PART 1

The coil spool (above) was formerly fabricated brass. Insulation prepared the mold contending with the problems of side walls .015" thick, close tolerances and a high production quota. Result: Liquidometer Corp. costs on this item reduced several HUNDRED p. c. High production quota met.

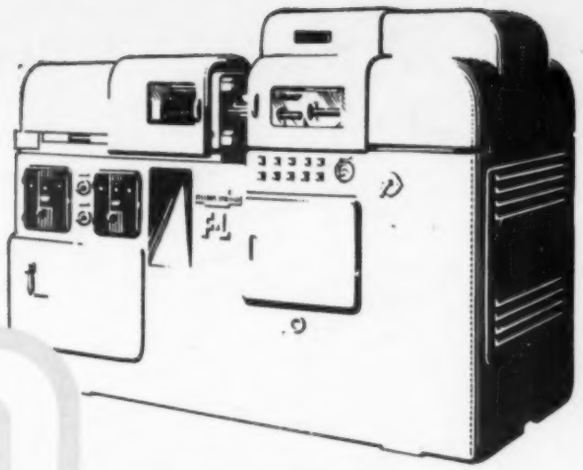
PART 2

The Sensitive Research Instrument Corp. consulted Insulation for molding an instrument panel approx. 225 Sq. In. Insulation, manufacturing with equipment geared for small and large size moldings, quickly solved the problem.

INSULATION MANUFACTURING CO., INC.

Custom Molders of Plastics for Industry

13 New York Avenue • Brooklyn 16, N. Y.



F-L Model 1B-3

NOW... A SMALL, FAST 3 MACHINE FOR 3 OUNCE SHOTS

2½ OZ.
STYRENE

3 OZ.
ACETATE

This FIRST FULLY-AUTOMATIC small machine with a plasticizing capacity up to 45 pounds per hour is a fitting addition to the line of F-L "Speed-Flo" Injection Molding Machines. A clock-controlled booster speeds injection of fully-plasticized material to more rapidly fill molds and thereby minimize weld marks. Two heating bands and dual-temperature control provide faster, more even heating, improved plasticizing control, and greater machine flexibility for handling a wide variety of parts and materials.

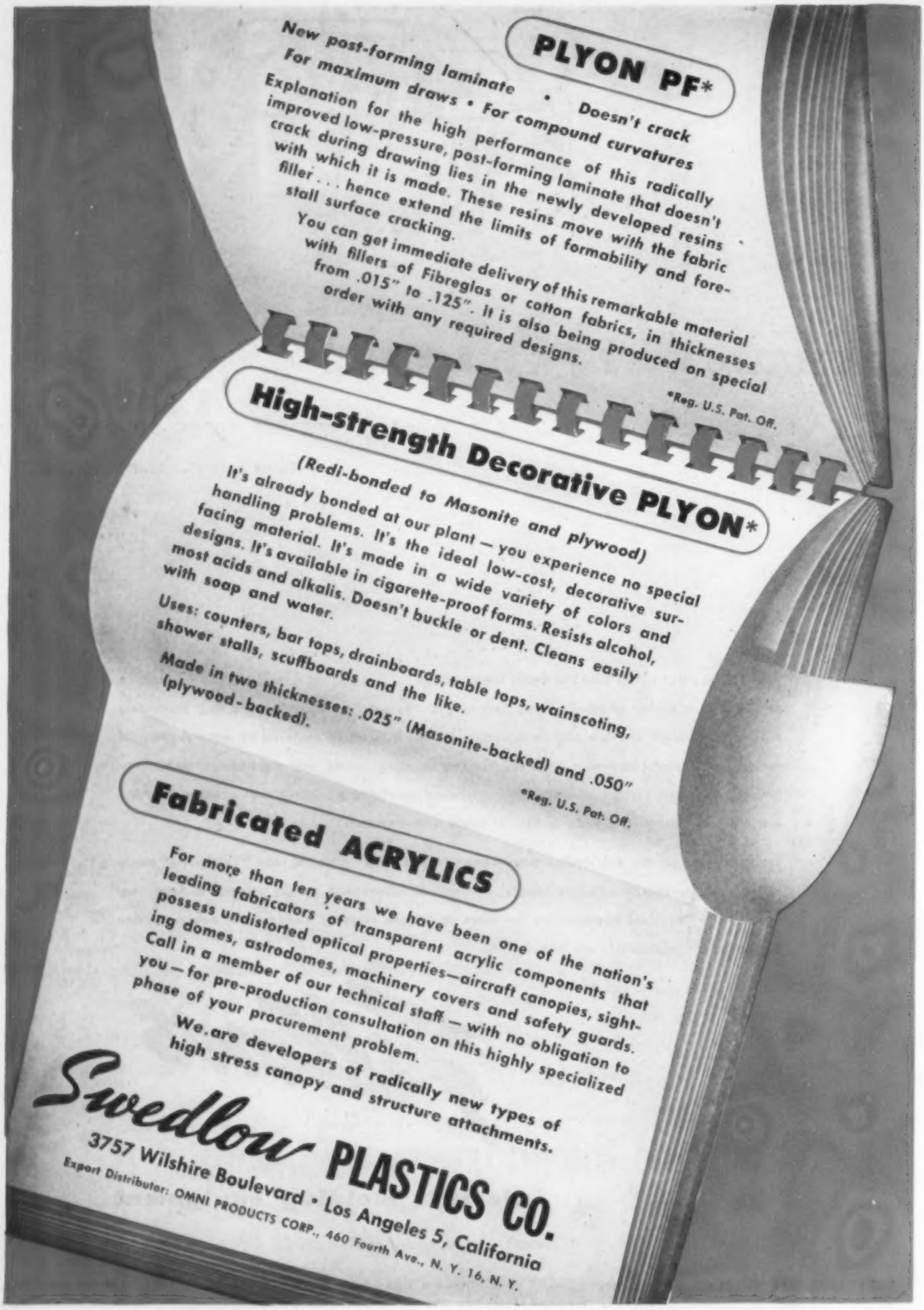
Incorporating all the F-L design advantages: "Speed-Flo" cylinder, and "Taper-Tite" separator; continuous-pressure-line toggle; centralized adjustment screw; volumetric feed control... it is the ideal combination for more profitable molding. Contact our nearest office for complete information on Model 1B-3.

Fellows

LEOMINSTER

injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Division, Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2; 640 West Town Office Bldg., Chicago 12; 7706 Empire State Bldg., New York 1. New England Distributor, Leominster Tool Co., Leominster, Mass.


PLYON PF*
New post-forming laminate • Doesn't crack for maximum draws • For compound curvatures
Explanation for the high performance of this radically improved low-pressure, post-forming laminate that doesn't crack during drawing lies in the newly developed resins with which it is made. These resins move with the fabric filler . . . hence extend the limits of formability and forestall surface cracking.
You can get immediate delivery of this remarkable material with fillers of Fibreglas or cotton fabrics, in thicknesses from .015" to .125". It is also being produced on special order with any required designs.
*Reg. U.S. Pat. Off.
High-strength Decorative PLYON*
(Redi-bonded to Masonite and plywood)
It's already bonded at our plant — you experience no special handling problems. It's the ideal low-cost, decorative surfacing material. It's made in a wide variety of colors and designs. It's available in cigarette-proof forms. Resists alcohol, most acids and alkalis. Doesn't buckle or dent. Cleans easily with soap and water.
Uses: counters, bar tops, drainboards, table tops, wainscoting, shower stalls, scuffboards and the like.
Made in two thicknesses: .025" (Masonite-backed) and .050" (plywood-backed).
*Reg. U.S. Pat. Off.
Fabricated ACRYLICS
For more than ten years we have been one of the nation's leading fabricators of transparent acrylic components that possess undistorted optical properties—aircraft canopies, sighting domes, astrodomes, machinery covers and safety guards. Call in a member of our technical staff — with no obligation to you — for pre-production consultation on this highly specialized phase of your procurement problem.
We are developers of radically new types of high stress canopy and structure attachments.
Swedlow PLASTICS CO.
3757 Wilshire Boulevard • Los Angeles 5, California
Export Distributor: OMNI PRODUCTS CORP., 460 Fourth Ave., N. Y. 16, N. Y.

5 GREAT ADVANTAGES . . . 3 EASY STEPS

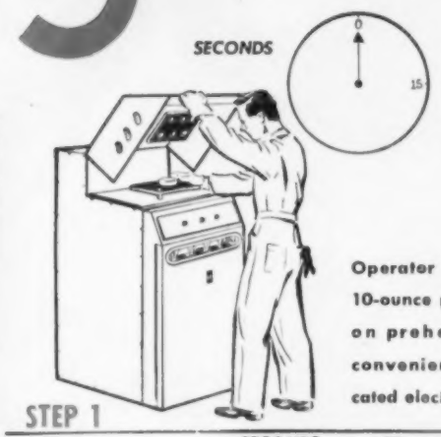
PLASTICS PREHEATER

Generating heat quickly and uniformly throughout the entire plastics preform by a 40-megacycle electronic field, the G-E 5-kw plastics preheater affords these five outstanding advantages to every molding shop with its simple 1-2-3 operation:

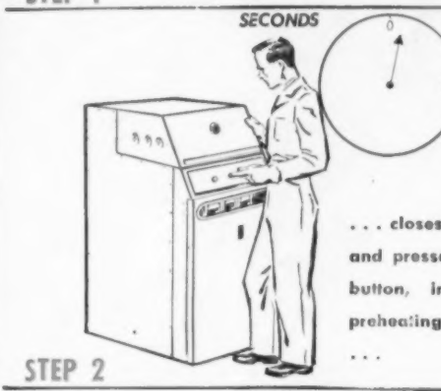
1. **Increased production** — electronic preheating saves warm-up time in mold, giving production increases up to 75 per cent:
2. **Reduced scrap losses**—uniform dielectric preheating minimizes surface-crust formations on preforms.
3. **Lower finishing costs**—thinner flash on mold parting line makes finishing operations easy, quick.
4. **Reduced material costs**—less expensive compounds previously considered impractical are made easy to mold.
5. **Accelerated curing time**—uniform chemical reaction initiated before molding.

The G-E plastics preheater couples these major operating benefits with a job-tested construction which incorporates all the requirements for heavy-duty, high-production industrial use. Low on maintenance and high in efficiency, this preheater offers a flexible means of obtaining all the cost- and time-saving advantages of dielectric preheating.

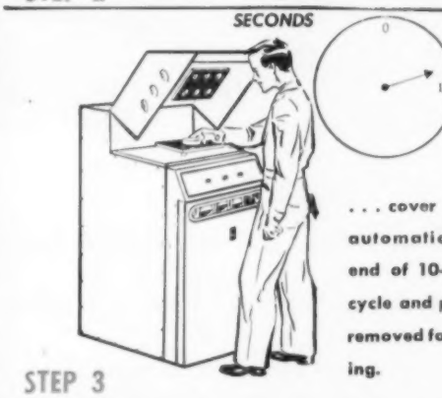
Get in touch with the Heating Specialist in the nearest G-E Office. He will be glad to discuss this modern production tool with you. And, in the meantime, send for free descriptive bulletin GEA-4623A, "G-E 5-kw, 40-megacycle Plastics Preheater." *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*



STEP 1 — Operator places 10-ounce preform on preheater's conveniently located electrode...



STEP 2 — . . . closes cover and presses start button, initiating preheating cycle . . .



STEP 3 — . . . cover opens automatically at end of 10-second cycle and preform removed for molding.

LOOK FOR THESE DESIGN FEATURES

- Sturdy Mechanical Construction
- Minimum Floor Space
- Portability
- Accessibility for Maintenance
- Two Timers
- Complete Safety Features

GENERAL ELECTRIC

675-156

Apparatus Department, Sect. C675-156
General Electric Company
Schenectady 5, N. Y.

Please send me free bulletin GEA-4623A, "G-E 5-kw, 40-megacycle Plastics Preheater."

Name .....

Company .....

Address .....

City ..... State .....

Appearance	Oily water-white liquid
Odor	Mild ester
Acidity (as Phthalic Acid)	0.01% by weight max.
Specific Gravity 20/20°C	1.047-1.049
Assay (ester content)	Minimum 99% by weight
Weight per gallon	Approximately 8.75 lb.

Containers: 50-55 gal. one-way steel barrels

* * *

THIS clear, high-boiling, water-white liquid is being widely used as a modifying agent and plasticizer with natural and synthetic resins as well as with certain synthetic elastomers.

It is especially recommended for use in nitrocellulose lacquers. Its compatibility and high plasticizing efficiency increase the elasticity of the finished coating.

Barrett Dibutyl Phthalate is well within A.S.T.M. specifications. Its excellent color and low odor suggest its use in special products such as fingernail lacquers and paper coatings.

DICYCLOHEXYL PHTHALATE

A white powder used in supported coatings and unsupported vinyl films. Imparts superior resistance to water and oil absorption.

PLASTICIZER 50-B

An excellent liquid solvent for vinyl resins, used in supported and unsupported vinyl sheeting and extruded vinyl products.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal, Que.

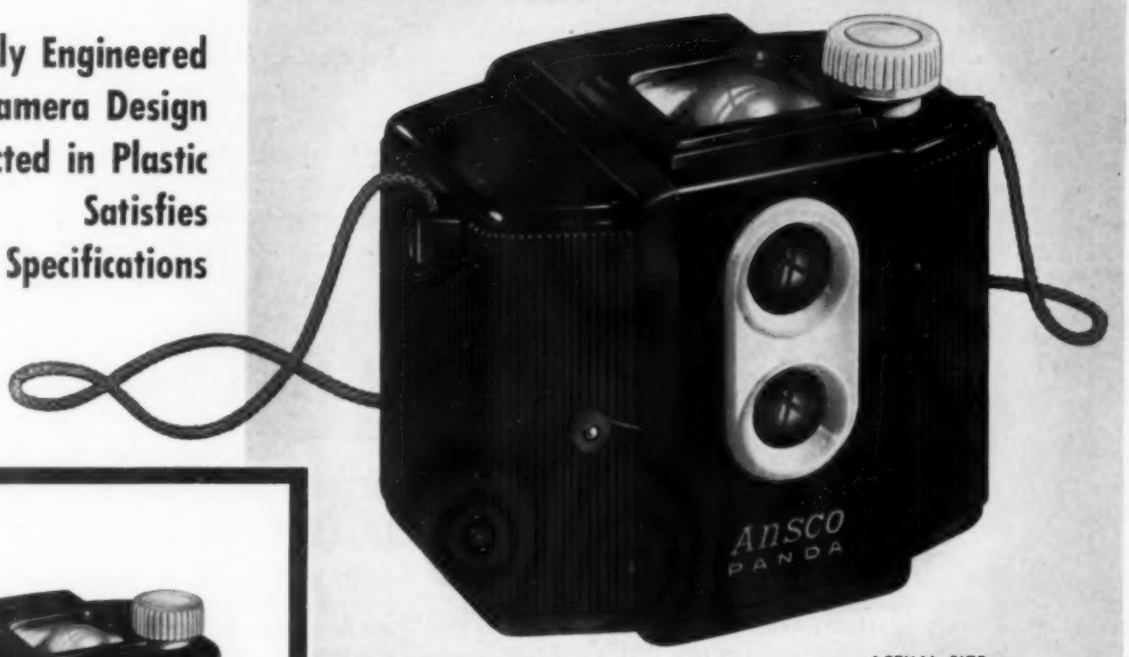
Barrett

Ansco PANDA CAMERA

"Look Pretty, Please"

To the New, Plastic "Panda"...this Comes Naturally!

Ingeniously Engineered Camera Design Projected in Plastic Satisfies Exacting Specifications



ACTUAL SIZE

Takes 12 Pictures, Size 2¼" x 2¼", Using Ansco 620 (PB20) Film

View of Cone Mold A562

View of Base Mold A563

Recent Successfully Completed Assignment, a Credit to Mold Construction, Material Selection and Precision Processing

As you can see, to the left, the design involved an inter-assembly of two separately molded plastic structures. Sliding downward, tongue provisions on the upper section (cone) vertically engage grooves in the lower section (case) to form, when seated, a fully enclosed light-tight housing. A half-turn finger lock in the base of the case anchors the cone in place.

So perfect-fitting a requirement called for perfectly constructed molds! The material, black polystyrene, was chosen for its dimensional stability, strength, lightweight and high heat resistance.

Injection processed in two properly gated molds, and exactly to the customer's specifications, the end result achieved its initial incentives . . . economy . . . eye-appeal . . . functional perfection.

Possibly the *Consolidated Way* can just as creditably fit into your own product picture. An inquiry will tell. Write today!

Consolidated
MOLDED PRODUCTS *Corporation*
309 CHERRY STREET,
SCRANTON 2, PA.

CMP

PRODUCT DEVELOPMENT • MOLD DESIGN • MOLD CONSTRUCTION • PLUNGER MOLDING • TRANSFER MOLDING • INJECTION MOLDING • COMPRESSION MOLDING

Branches: NEW YORK, *1790 Broadway* • CHICAGO, *549 W. Randolph St.* • DETROIT, *550 Maccabees Bldg.* • CLEVELAND, *4614 Prospect Av.* • BRIDGEPORT, *211 State Street.*

YOU CAN LOWER YOUR BREAK-EVEN POINT WITH ELMES AIR-POWERED HYDRAULIC PRESSES

Plastics molders are bringing down "break-even points". . . raising efficiency . . . *cutting costs to new lows* with Elmes air-powered hydraulic presses. For nearly a century, Elmes research and production facilities have been dedicated to progress. Elmes was *first to use air* for the quick-closing of small manual presses. And, from that experience, now has come the Elmes Hydrolair with *full power-operation.* Here's how air power pays off.

Air-powered Elmes hydraulic presses have neither pumps nor motors. That means *savings in first cost;* smaller size; lighter weight. They are easy to install, *and to move*—no floor-load or foundation worries. Power is taken entirely from the regular shop air line, yet air requirements are *negligible.* Air-powered Elmes presses are fast, quiet, simple, easy to use—consume no power when closed. They're the profit way to *efficient* quality molding.

ENGINEERED BY ELMES
Good Hydraulic Production Equipment Since 1851

FREE BULLETIN NO. 5200 GIVES FULL DETAILS OF ELMES HYDRAULIC EQUIPMENT FOR PLASTICS MOLDERS • ASK FOR IT.

SMALL-PRODUCTION PRESSES. Air-actuated quick-closing. Fastest of all manual presses. Built to Elmes "big press" standards of precision and performance. For pre-checking new molds and dies—testing specimens—establishing heat, pressure, and curing time—actual production. Bench-types to 30 tons. Also with full-manual operation.

ELMES HYDROLAIRS. Full *power-operated* hydraulic presses. Take their power *entirely* from the shop air line. For molding plastics and rubber, laminating, and many other pressure purposes. Fast, durable, compact—in bench types to 30 tons; floor types to 50 tons. Automatic push-button time-cycle control optional on 50-ton press.

Elmes 20-ton Small-Production Press

Elmes 30-ton Hydrolair

ELMES ENGINEERING WORKS *of* AMERICAN STEEL FOUNDRIES, 225 N. Morgan St., Chicago 7, Ill.

Distributors in Principal Industrial Centers

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES


Filigree
THE NEWEST THING IN
PLASTIC EXTRUSIONS
Here's another first by Yardley — smart, new filigree designs in extruded belting and trim.
Available in seven standard styles — in white, black, red and brown. Other colors available on special orders. Illustrations approximately two thirds actual size.
Standard shapes also available in flat, patent calf, embossed or with wiggle edge. Sold by the yard. Standard discounts.
YARDLEY Plastics Co.
142 PARSONS AVE. COLUMBUS 15, OHIO
NEW YORK OFFICE
20 Vesey St. Barclay 7-7264

4 *Luminous* ITEMS THAT *Catch* EXTRA SALES

These 4 *"glowing"* products are injection molded of "luminous" plastics: (left) the Day or Night Fishing Float, that snaps on or off your line in an instant, is molded by Recto Molded Products, Inc. for the Dayton Bait Co.; (center) the "Shining" Shiner Minnow, recommended for night fishing, is molded by Plano Molding Co. for L & S Bait Co.; (right) the Bell Lamp Cordpull, for that HARD-TO-FIND light, is molded for Welch Industries, Inc.; and (bottom) "Happy Birthday" cake ornament is molded by John Mack & Son Molded Products Co. All are molded of polystyrene base Paulite (Luminescent Plastic Corp.) except the Minnow which is of Tenite II base Paulite.

Products Are MORE Practical and Novel When They *"Glow"* in the Dark

BY MAKING their products of "luminous" plastic, the manufacturers of the articles illustrated did not have to cast around for new items to help get *plus* sales. The property of "glowing in the dark" gives these products the necessary sales appeal that attracts more buyers—increases sales and profits . . . These are but a few of the 101 applications** for "luminous" plastics.† Others include flashlights, clock cases and dials, table tops, safety signs, lamps and lampshades, switch plates and shields, push buttons, toys, gifts, and novelties . . . Perhaps you, too, have a product that can be made easier-to-sell by making it easier-to-find in the dark. Why not discuss how to do it with a member of our technical staff.

**Send for your copy of our booklet "101 Useful Luminescent Applications."
†Available as molding granules or powders, sheets, film and coatings. Names of suppliers of "luminous" plastics will be sent on request.

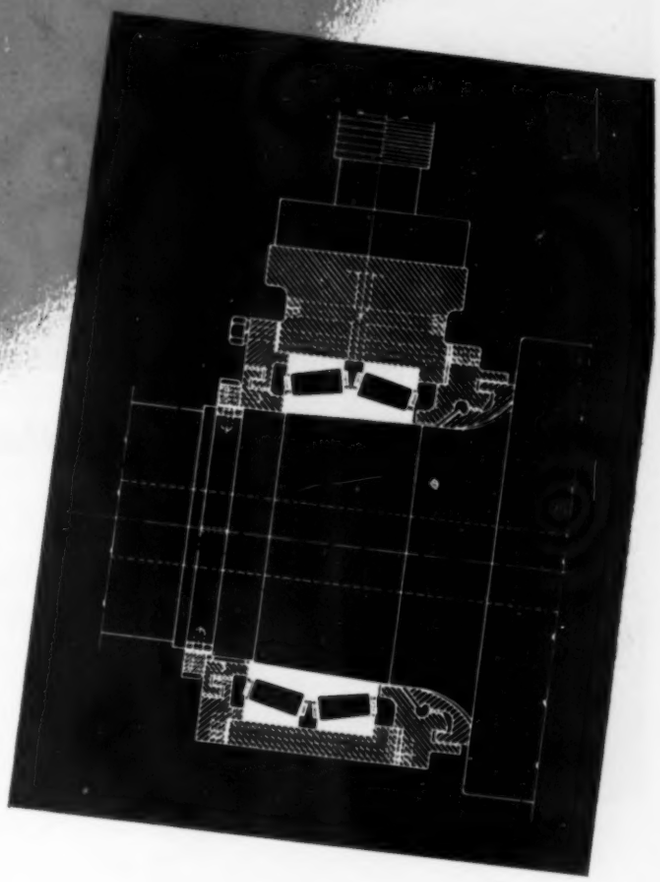
* Reg. U. S. Pat. Off.

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC CO. • 160 Front Street, New York 7, N. Y.

It's **Horse Head*** **Luminescent Pigments** ***that MAKE these Plastics "Glow"***

HOW TO OBTAIN GREATER *Rigidity and Accuracy* IN PLASTICS CALENDERS



The essence of accuracy in plastics calenders is close and constant control of the predetermined gauge of the product throughout its width and length.

This demands maximum roll rigidity—minimum bearing runout—and minimum roll deflection under all load and temperature conditions.

By making possible (a) maximum roll neck diameter and strength (b) maximum radial, thrust and combined load capacity, Timken DIT type balanced proportion bearings as shown in the drawing, help provide the rigidity and endurance necessary for dependable, precision performance.

In addition, Timken bearings enable extremely fine adjustments to be made during installation, thus assuring minimum vertical movement of the calender rolls regardless of operating temperature.

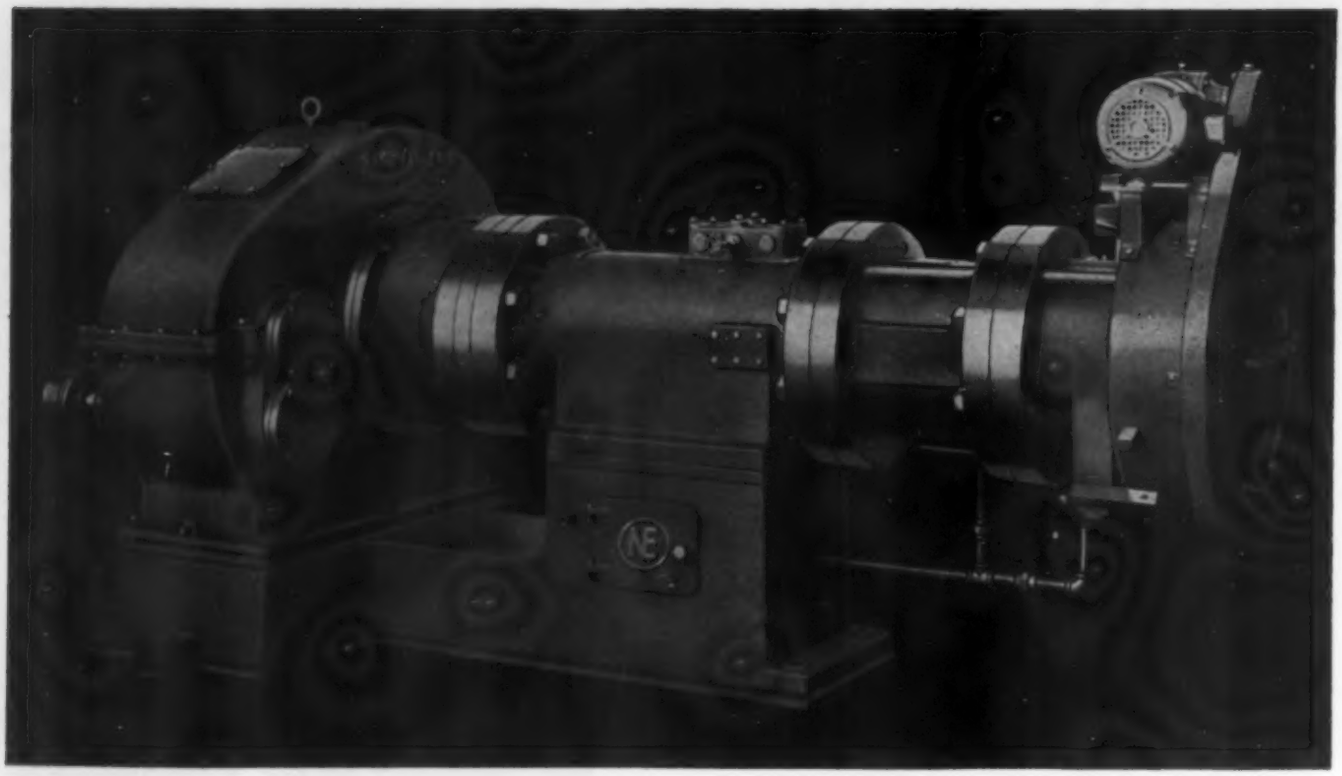
The Timken bearings furnished for these calender roll mountings are of the precision type. Calender rolls may be refinished when necessary while supported on their bearings. Inaccuracies in the O.D. of the roll necks or roll barrels are compensated for by the precision of the bearings themselves.

To make sure of getting all these advantages in your calenders make sure the trade-mark "TIMKEN" appears on every bearing you use.

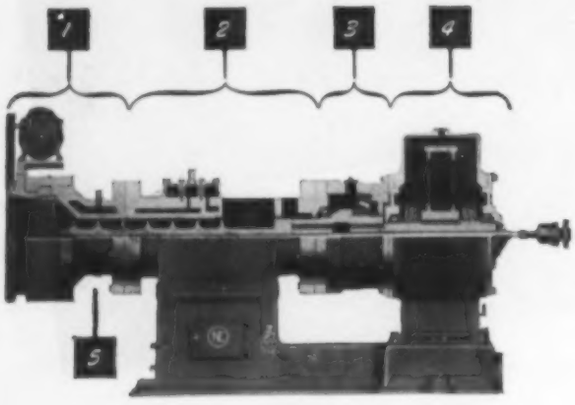
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO · CABLE ADDRESS "TIMROSCO"

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←



NATIONAL-ERIE *features* Sturdy Unit Construction



UNIT CONSTRUCTION

1—HEAD UNIT
2—CYLINDER UNIT
3—THRUST UNIT
4—GEAR REDUCTION UNIT
5—STOCK SCREW

Shown above is an 8½" NE Extruder. It has a wide application in processing natural and reclaimed rubber, plastic materials and extruding finished plastic shapes. Like all NE Tubers, it features heavy unit construction for long trouble-free service and ready accessibility for inspection.

No two applications are alike. Materials and processing speeds vary. NE engineers work closely with your engineers to get the best combination of unit assemblies. Great advance has been made in electric heating element design which considerably improves performance.

We have supplied almost every leading processor of basic plastic and rubber materials and have a wealth of general experience to help you in working out your special application. Write us today about your extrusion problems.

● *Write for copy of our general catalog that fully describes this 5-unit construction.*

NATIONAL ERIE CORPORATION

ERIE, PENNSYLVANIA • U. S. A.

Lock a Rainbow

IN A STEEL SAFE . . .

This is not "just another ad with a trick headline".

It is an accurate-as-possible description of a lovely new material that has a combination of beauty of color and durability your customers have wanted for a long time.

This material is called *Resproid*, and it comes in a rainbow of colors that are safe from dirt anywhere because *Resproid* can be cleaned in seconds with just a damp cloth. *Resproid* itself is practically indestructible in everyday use, resistant to cracking, fading, scuffing and abrasion—to perspiration, most acids, alcohol, alkalies, oil and grease.

Resproid is made in a wide range of lovely styles and weights that give new beauty, new practicality, to shower curtains, waterproof garments, aprons, cottage sets, handbags, luggage, upholstery, belts—a variety of products as limitless as your own imagination.

And with a big, new, full-color advertising campaign in Good Housekeeping magazine telling over 5,500,000 potential customers of the beauty and resistance to wear of things made of *Resproid*, there's a profit opportunity here you can't afford to miss. If you're not already using *Resproid* to increase your sales, send for samples now. Respro Inc., Cranston 10, R. I.

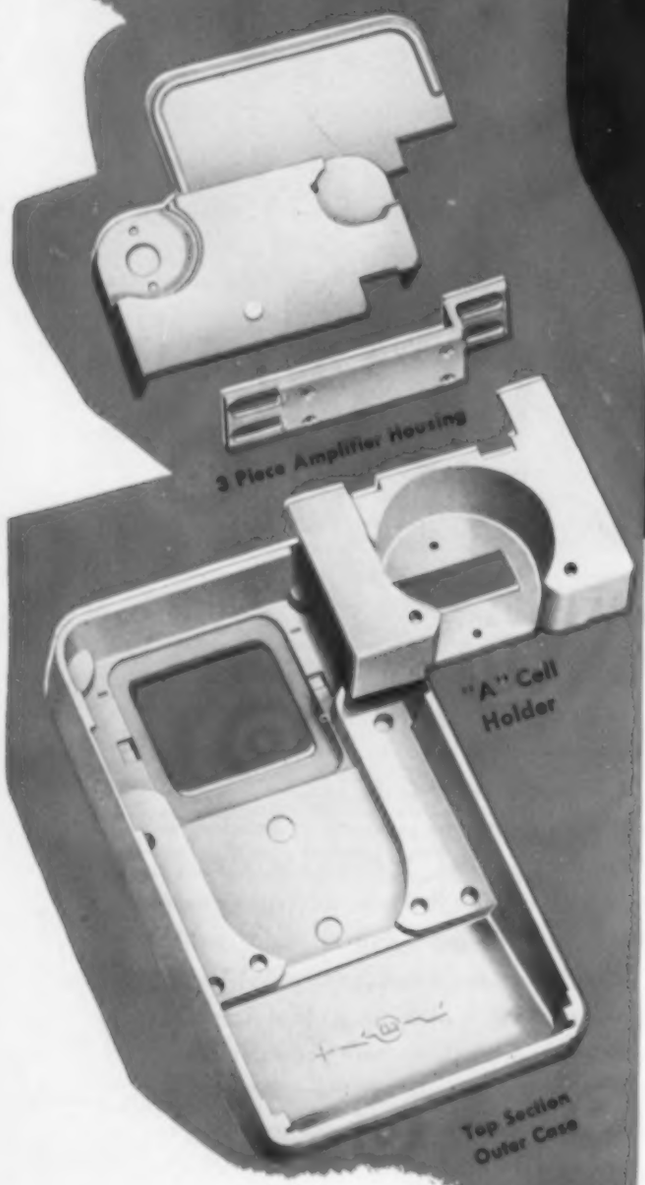
Resproid

TRADE MARK REG. U. S. PATENT OFFICE

Show this tag on all your RESPROID products. With the big RESPROID ad campaign in Good Housekeeping, it's an important selling point for you.

Difficult and Exacting

BUT AGAIN MPM SUCCESSFULLY HANDLED THE ENTIRE PROJECT —MOLDS AND MOLDING....



HERE is another case where Minneapolis Plastic Molders specialized experience has paid off in solving an unusually difficult molding problem involving rigid specifications.

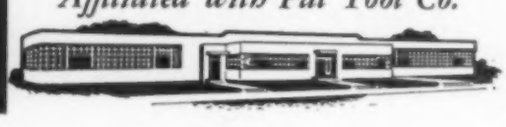
All mold making and molding for the sensational new Microtone "Lifetime" Hearing Aid has been handled by MPM. That means full responsibility centralized at one source. The three pieces of the amplifier housing must fit together exactly. Here, because of their complex and fragile design, and to provide dimensional stability and minimize warpage, the parts are transfer molded. The assembled amplifier unit, together with the "A" cell holder must then fit with glove-like snugness into the compression molded hearing aid case. All six parts are molded from urea formaldehyde.

On this assignment as with the work being done for other manufacturers of nationally known products, Minneapolis Plastic Molders achievements are helping to broaden the field for the entire plastics industry. And remember, MPM facilities are complete—mold design, mold making, hobs and hobbing, compression, injection and transfer molding.

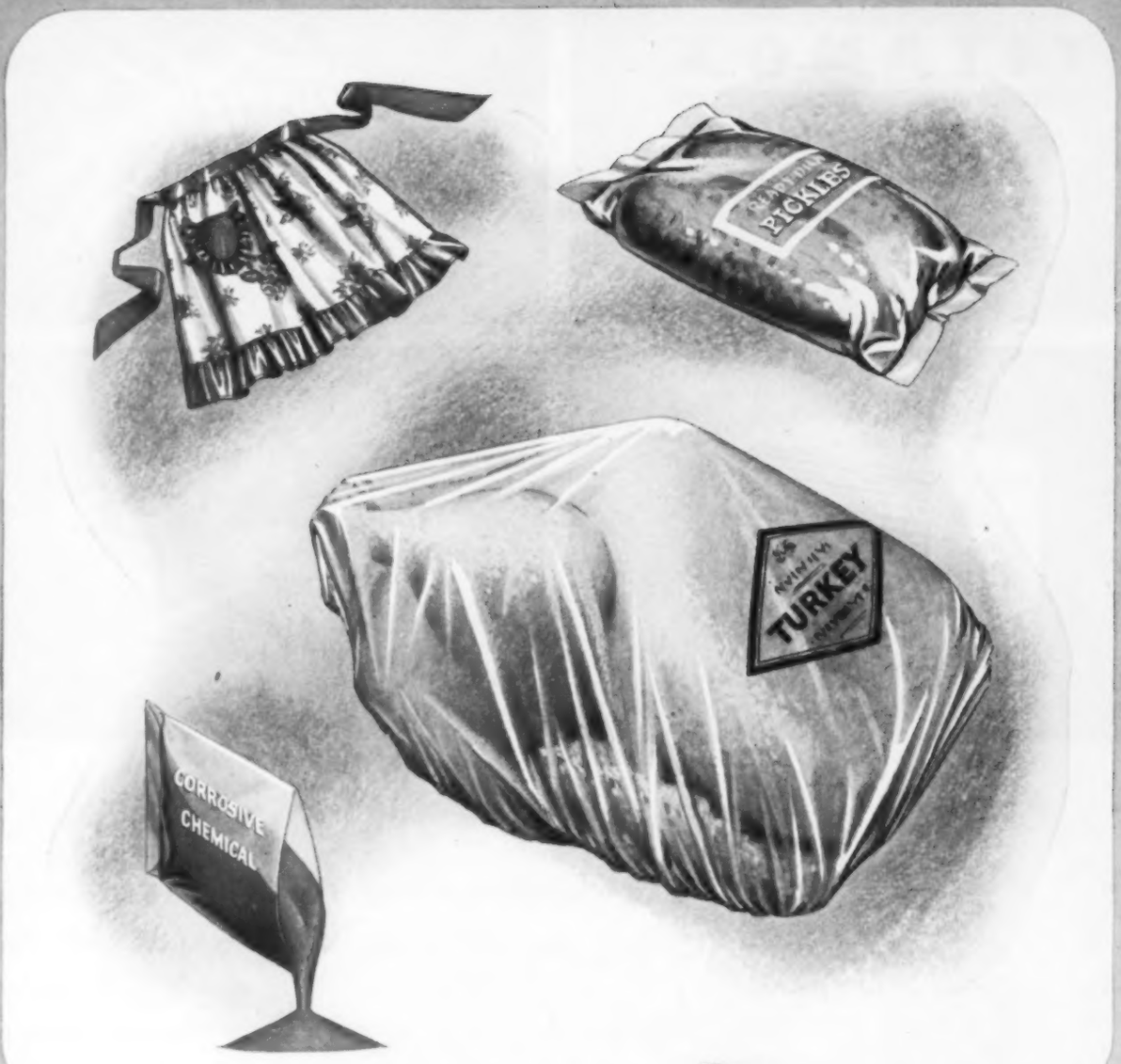
MINNEAPOLIS PLASTIC MOLDERS, INC.

Affiliated with Pal Tool Co.

4411 HIAWATHA AVENUE
MINNEAPOLIS 6, MINN.



FOOD . . . CHEMICALS . . . CONSUMERS . . .



EVEN WHEN STRETCHED several hundred per cent, Plax Polyethylene sheet is tough, moisture-proof, odorless, tasteless, and pleasing to touch.

An ideal material for food packaging, it protects goodness without hiding it. Chemical inertness makes it an effective wrapper for everything from food to corrosive chemicals. These qualities, plus color, have led to its wide use in the home—as aprons, clothes bags, bowl covers, etc.

Plax also supplies Polyflex* Sheet and Film, and cellulose acetate, cellulose acetate butyrate and ethyl cellulose sheet and film. To be sure you have the complete story about Plax products, please write for details.

*T.M. reg. U. S. Pat. Off.

PLAX
FOR PLASTICS
NOT SUBSTITUTES···IMPROVEMENTS

133 WALNUT STREET ★ HARTFORD 5, CONNECTICUT
In Canada — Canadian Industries, Ltd., Montreal

ASK STOKES

If 1/6 of a man can make 7000 closures per hour...

. . . how many closures, etc.? Well, it runs into many thousands if you use a *whole* man and let him operate through a full day on a battery of Stokes Automatic Closure Presses.

All he has to do is fill the hoppers and take away the molded closures.

The Stokes Closure Press automatically unthreads threaded closures and delivers molded caps of uniformly high quality and correct density without shorts, checking, or discoloration.

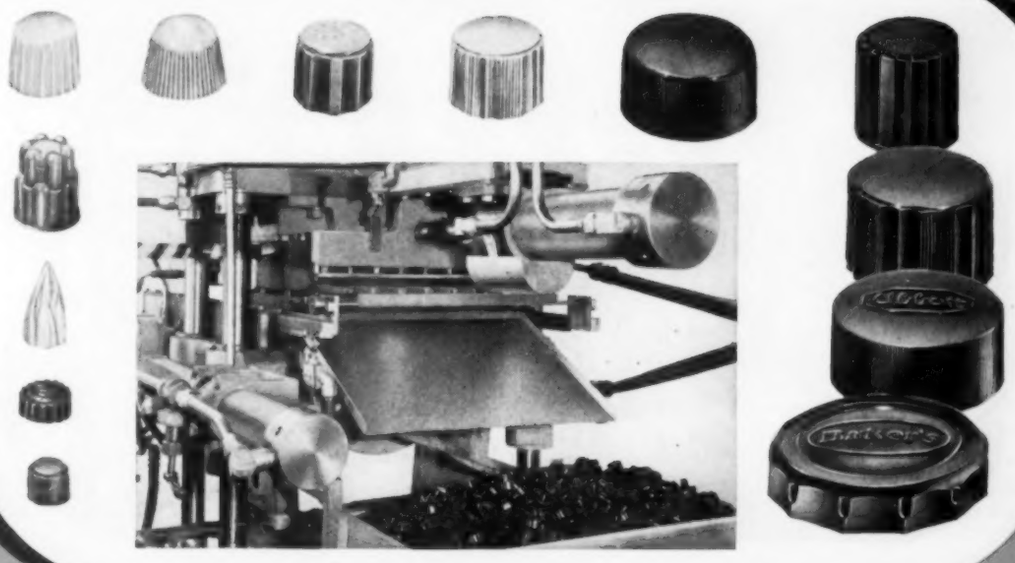
Change-over is simple when it is necessary to use different molds. You can make closures of many designs and sizes with internal or external threads.

Stokes make a *complete* line of automatic and semi-automatic plastic molding presses, but the automatic Closure Presses (in 2 models of different capacities) are designed specifically for the making of closures.

F. J. Stokes Machine Co., 5934 Tabor Road, Philadelphia 20, Penna.

Stokes also makes Semi-Automatic Plastic Molding Presses, Preforming Presses, Plunger Presses, Powder Metal and Ceramic Presses, Vacuum Pumps and Gages, High Vacuum Processing Equipment and many Special Machines.

FJS



Delivery end of Stokes Automatic Closure Press, and typical closures produced.

STOKES KNOWS HOW

ASK STOKES

Zero Man-power operates this Plastic Molding Press

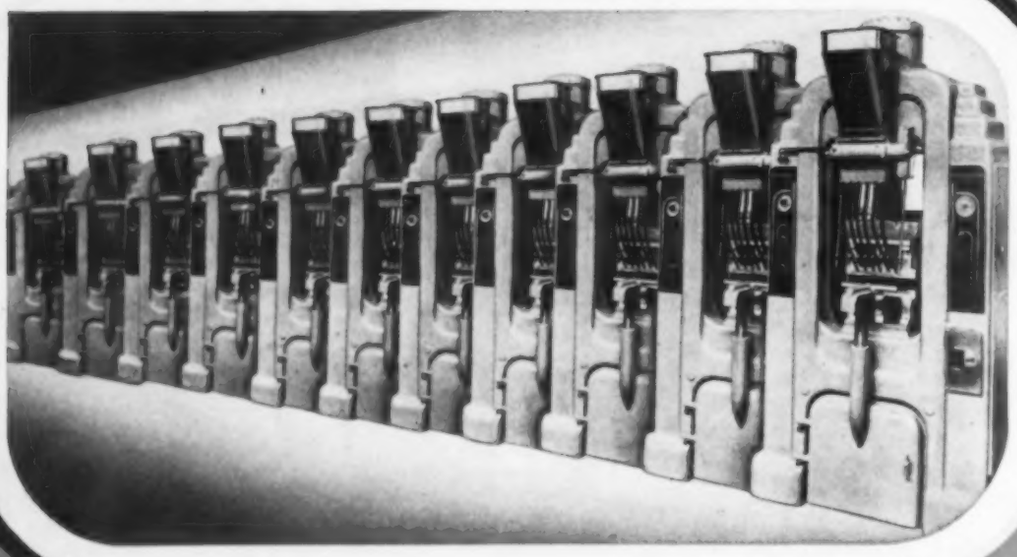
THIS is the Stokes fully automatic Model 235. To be sure, you need a man to feed it, but he can feed a whole battery of 'em.

Fully automatic cycling gives more production per cavity, requires fewer mold-cavities. Therefore molds cost less and are more quickly readied for production. Thus, every second counts for production, as Model 235 runs on for 24 hours a day. Material savings are often as high as 10% . . . production as high as 70,000 pieces per week, with rejects at a minimum.

If automatic molding is the answer to your problem, the Stokes Model 235 is a key to your answer. In any case there is a Stokes Plastic Molding Press for the needs of every maker of plastic parts. Stokes makes a *complete* line of Plastic Molding presses . . . gives *complete* advisory service on every phase of molding procedure. Write F. J. Stokes Machine Company, 5934 Tabor Road, Philadelphia 20, Penna.

Stokes also makes Semi-Automatic Plastic Molding Presses, Preforming Presses, Plunger Presses, Powder Metal and Ceramic Presses, Vacuum Pumps and Gages, High Vacuum Processing Equipment and many Special Machines.

FJS



STOKES KNOWS HOW

12 AIDS to better, more economical molding from METASAP MOLD LUBRICANTS

Photo Courtesy Boonton Molding Co., Boonton, N. J.

METASAP STEARATES, flowing under heat and pressure to the surface of your compound, assure . . .

. . . 4 AIDS TO EASIER PRODUCTION . . . (1). No sticking during rolling. (2). No shut-downs to scrape off mills. (3). Operation at lower pressure during molding. (4). Easy release from mold; Metasap can also be "dusted" on molds to prevent sticking.

. . . 4 AIDS TO ECONOMICAL PRODUCTION . . . (1). Increased molding cycles. (2). Greater production—fewer rejects. (3). Better flow saves resin. (4). Longer die life.

. . . 4 AIDS TO QUALITY PRODUCTION . . . (1). No staining of molds results in smoother-finished molded products. (2). No "blooming". (3). Greater penetrability also improves finish. (4). Metasap is long experienced in adapting stearates to individual needs.

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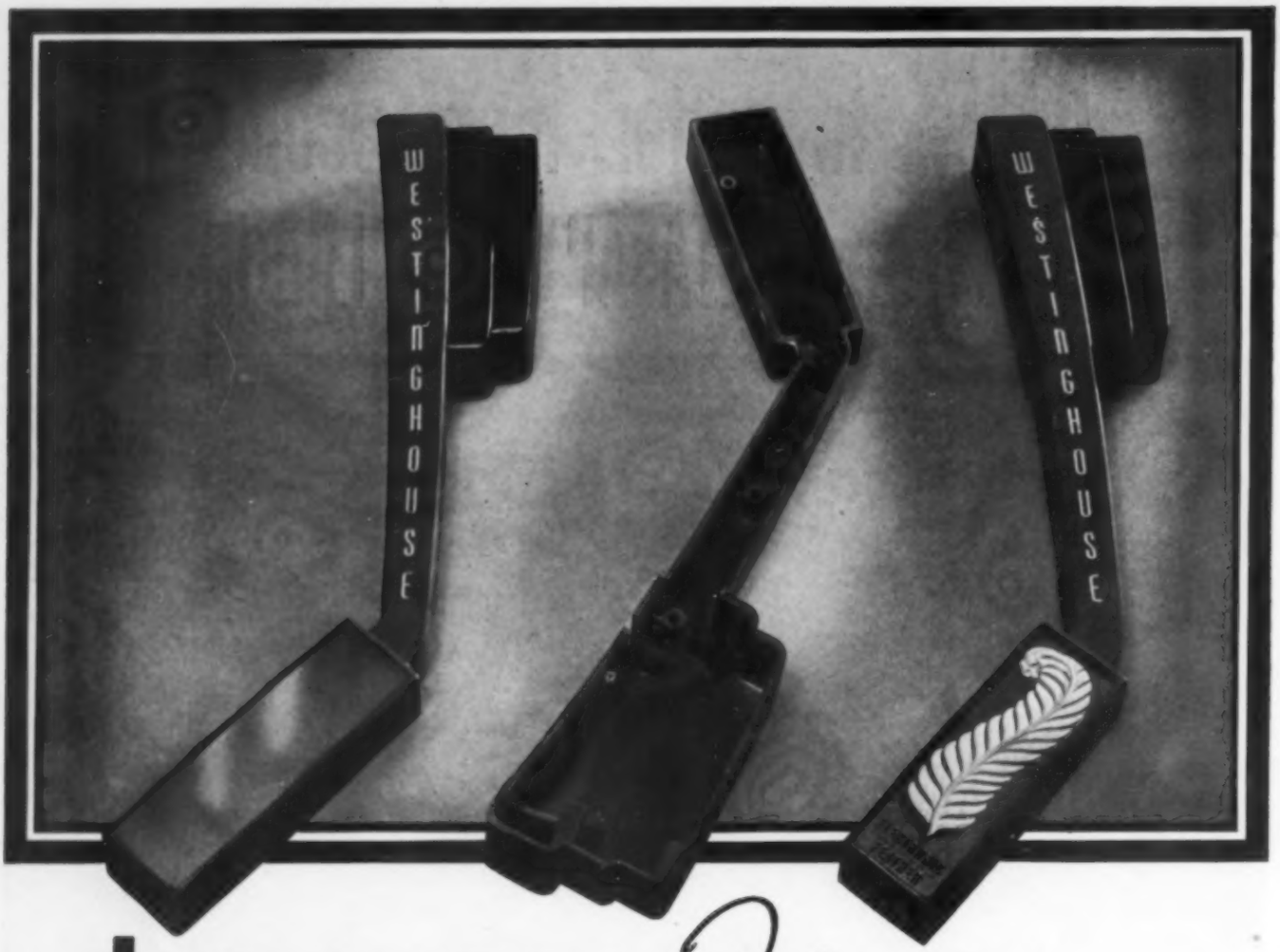

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Illustrated are tone arms used on Westinghouse Automatic Record Changers. These tone arms are molded and decorated by CRUVER for the V-M Corporation, Benton Harbor, Michigan, manufacturers of record changer equipment.

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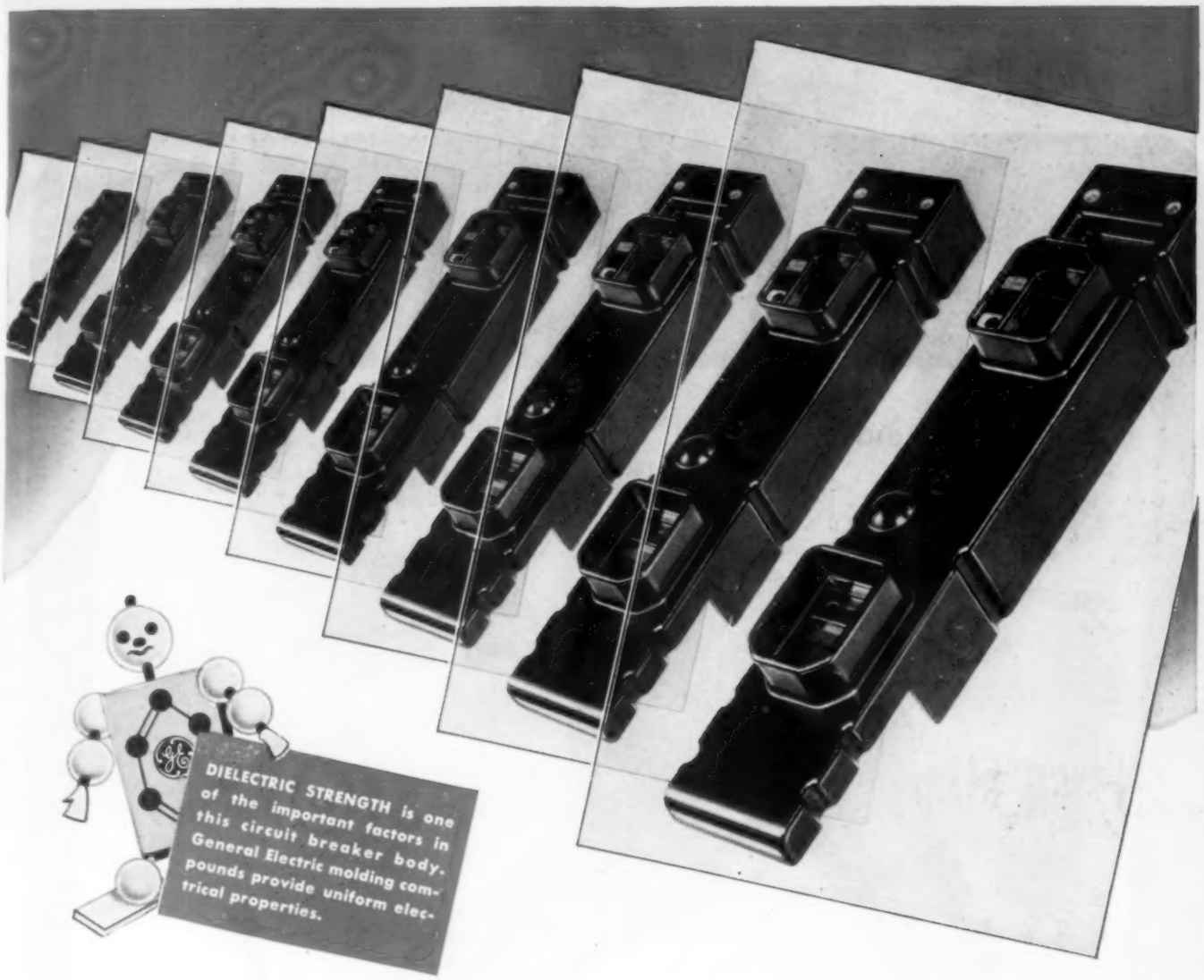

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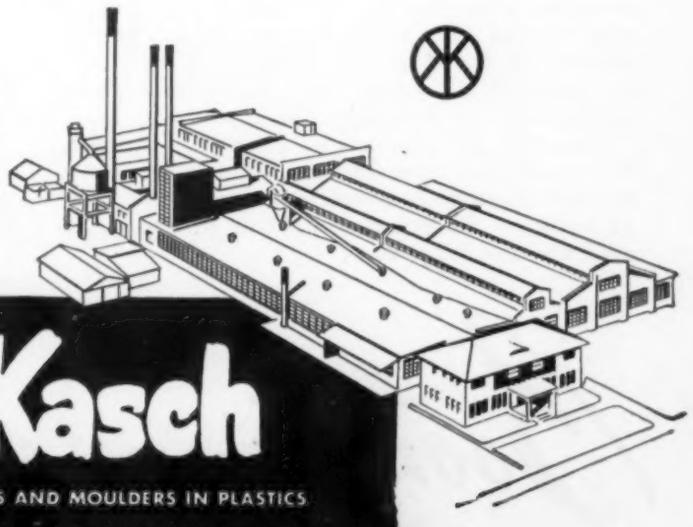

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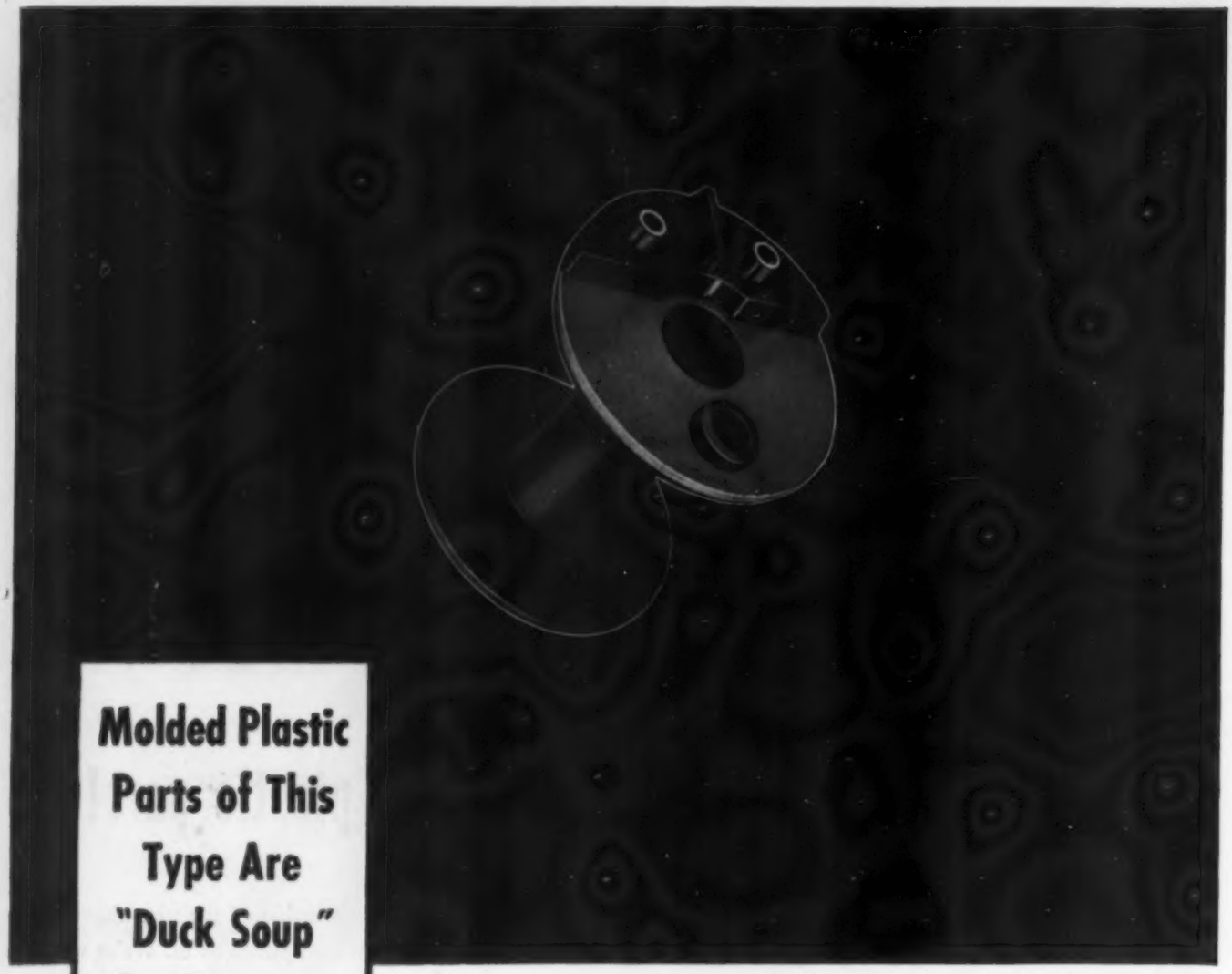

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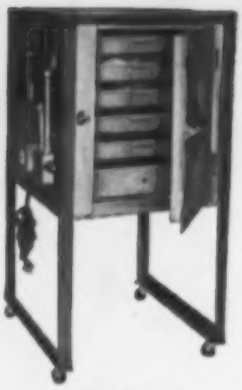

MODEL NO. 1
Single Door: Width 24½"
Five trays 15" x 22" x 2½"
Height 50" — Depth 28½"
Heating Element 1800 watts.
Thermostatic Control 100° to 300°F.

MODEL NO. 3
Double Decker: Width 48"
Height 68½" — Depth 28½"
Twenty Trays 15" x 22" x 2½"

MODEL NO. 2
Double Door: Width 48"
Height 50" — Depth 28½"
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Model No. 3 is two Model 2 units placed one above the other. They can be operated independently of each other and the top unit can be used in reverse position whenever desired.

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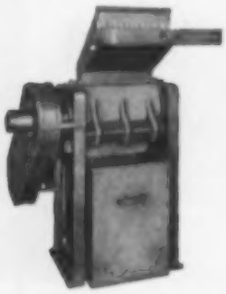

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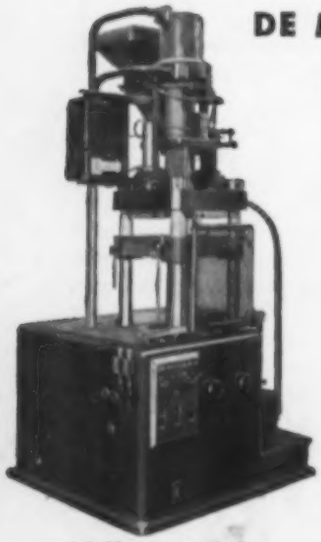

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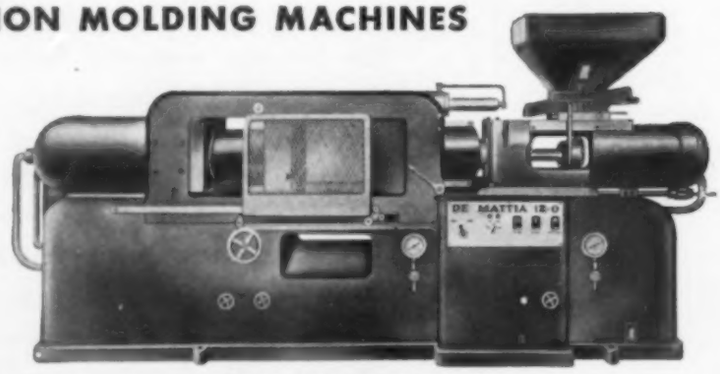

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J. E. Fiskelson
The Duralux Company

From drawing board to finished product in eight weeks. Here's another example of General Industries' ability to meet a manufacturer's urgent production and merchandising needs *in a hurry.*

In late March, 1947, drawings were completed for a new unbreakable Duralux aluminum coffee maker. Aluminum and facilities for its fabrication were available. But handles and unique 6-purpose covers of molded plastics were needed FAST. That's when The General Industries Company was called in.

GI engineers modified original designs to cut molding costs . . . specified proper plastic material for greatest utility. Then multiple cavity molds were designed and produced by General Industries' own expert tool makers . . . and the first production run of handles and covers was shipped *less than two months after the original designs were received.*

This is but one case in which General Industries' quarter-century of plastics molding experience and engineering "know-how" have proved unusually profitable to many manufacturers. It's a good reason, too, why General Industries *—leader in the production of custom molded plastics*—welcomes your problems.

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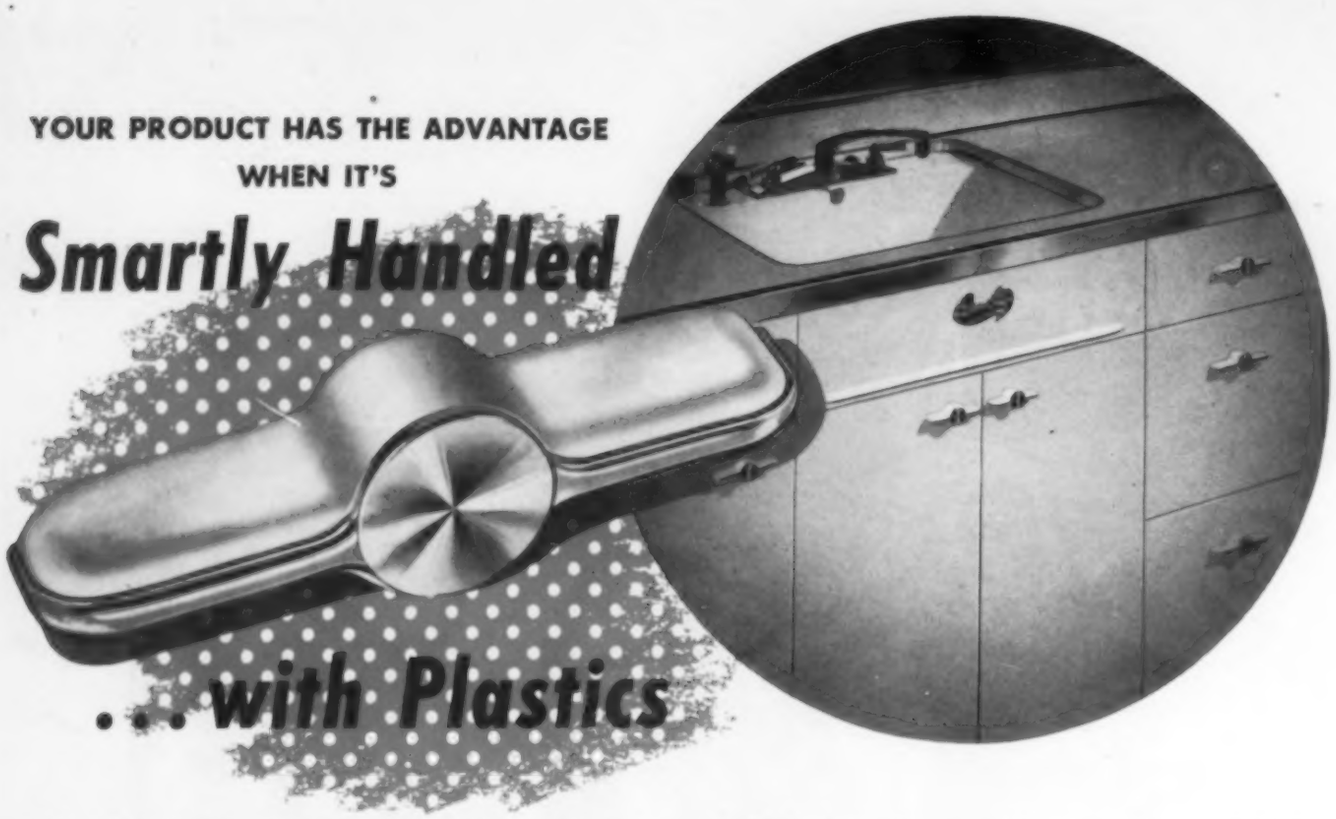
WHEN IT'S

Smartly Handled



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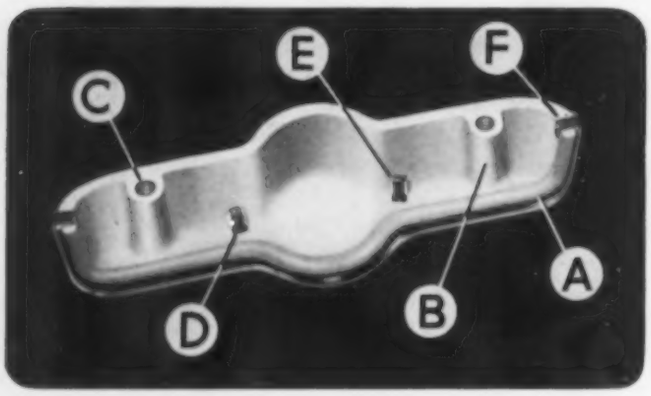

Bright, snowy white polystyrene has many advantages for kitchen use besides its well retained color. It is highly resistant to moisture and cleaning solutions. The handles will not easily chip or crack because good plastics design has included an ample reinforcing rim (A) and sturdy supports (B). Holes (C) are for mounting screws. Center prongs from the chrome trim are inserted in holes (D) and fastened on shoulders (E). End prongs fit flush in notches (F). Strength is assured by adequate filletting all around.

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MANY THINGS ARE BETTER BECAUSE OF PLASTICS

VOLUME 25 JULY 1948 NUMBER 11

MODERN PLASTICS

RIGHT BEFORE YOUR EYES

Plastics are becoming more and more important in the manufacture of frames for spectacles and sunglasses. Contact lenses are made of plastic, and molded plastic eyeglass lenses may soon be on the market

IN THE plastics industry, there is an important large volume application which is seldom mentioned, perhaps because it is literally right in front of people's eyes. The application, which grows in importance every year, is the use of plastics in spectacles and sunglasses.

Few people in the plastics industry realize that the ophthalmic industry is the largest consumer of cellulose nitrate sheet stock. With the few exceptions mentioned in the next paragraph, all plastic ophthalmic frames (frames for prescription lenses) are fabricated of nitrate.

The exceptions to this rule are: 1) some highly decorative "fashion" frames which are often made of acrylic, and 2) injection molded cellulose propionate frames which have only recently been put on the market.

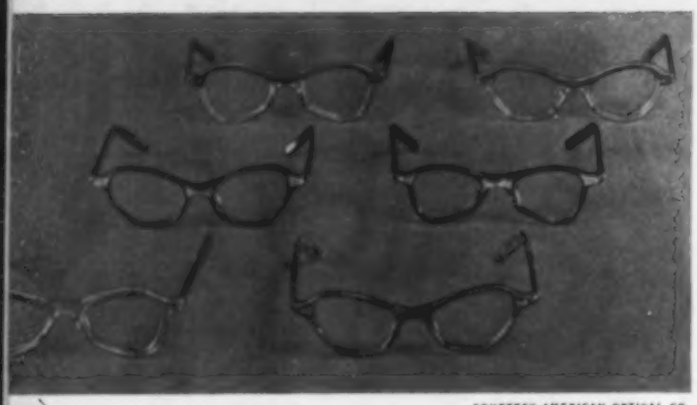
In addition to cellulose nitrate, the manufacture of spectacles, sunglasses, and contact lenses involves the use of cellulose acetate, acrylic, cellulose acetate butyrate, polyvinyl alcohol, and (a recent innovation) cellulose propionate. Of these materials, acrylic and cellulose propionate are used for ophthalmic frames; acrylic, acetate, and butyrate are used for

All-plastic sunglasses have one-piece cellulose acetate butyrate lens with polyvinyl alcohol polarizer. Frame is injection molded butyrate

COURTESY AMERICAN OPTICAL CO

Simple, inconspicuous flesh-colored plastic frames are popular for prescription glasses. Frames shown are fabricated of cellulose nitrate

COURTESY BAUSCH & LOMB OPTICAL CO.



COURTESY AMERICAN OPTICAL CO.

Plain ophthalmic frames (front) can be varied by adding metal medallions (center) or strip of colored nitrate

COURTESY G. M. L. PROCESS CORP.

Unlimited range of decorative designs can be metal-plated on plastic frames. Note intricate design on frame at left

Acrylic is often used for decorative frames. Carved transparent frames and metal-plated opaque frames are shown

COURTESY ROHM & HAAS CO.

sunglass frames; and butyrate and polyvinyl alcohol are used in the manufacture of Polaroid sunglass lenses. Acrylic is also used for contact lenses and, as yet on an experimental basis, for other types of lenses.

Conventional ophthalmic frames

Some ten million ophthalmic frames of all types are manufactured in the United States each year —and roughly 50% of them are plastic. The percentage varies from year to year and from manufacturer to manufacturer. One large company, for example, says that about 60% of its ophthalmic frames are nitrate and 40% metal. Another manufacturer says that "in ophthalmic frames, metal still leads plastic by a substantial margin."

It should be noted that even metal-framed glasses make use of some plastic for small parts like nosepieces, temple pieces, etc. These small parts are usually fabricated, and are usually made of cellulose nitrate.

In spectacles, as in all other things, there are styles, fashions, and, therefore, trends. Not too long ago, fashion favored glasses which were as inconspicuous as possible. This fashion promoted the sale of rimless glasses, thin metal frames, and flesh-colored plastic frames.

Those types of frames are still large volume items. But there is now a marked trend towards frames which do not attempt to hide their existence. The present fashion favors frames which are colorful and designed for decorative as well as functional purposes. The result is an increase in the market for plastic frames because of the varied color and design possibilities inherent in plastics.

Fabricated frames preferred

As mentioned above, the vast majority of ophthalmic frames are fabricated of cellulose nitrate. Some of the steps in the fabrication of such frames are shown in the series of photographs at the end of this article. If materials other than cellulose nitrate were used, plastic frames could probably be produced more economically by injection molding. But most producers feel that the advantages of fabricated frames outweigh possible economies in this direction.

Fabricated cellulose nitrate frames have greater dimensional stability than molded frames, yet expand more easily when heated for insertion of lenses. In addition, more attractive and more uniform mottles can be obtained in sheet stock than can possibly be incorporated in molded frames. Some manufacturers also say that fabricated frames have a more attractive surface luster than do injection molded frames.

In the ophthalmic industry cellulose nitrate frames are called "Zylonite" frames or, more briefly, "Zyl." The term is sometimes used to include cellulose acetate, but this usage is not common. It

is always capitalized like a trade name, but veterans in the ophthalmic industry claim that the term has been in general use for at least 30 years. No one seems to know the origin of the term. One theory is that Zylonite was once the trade name of a British company which manufactured spectacle frames or sold cellulose nitrate to frame manufacturers.

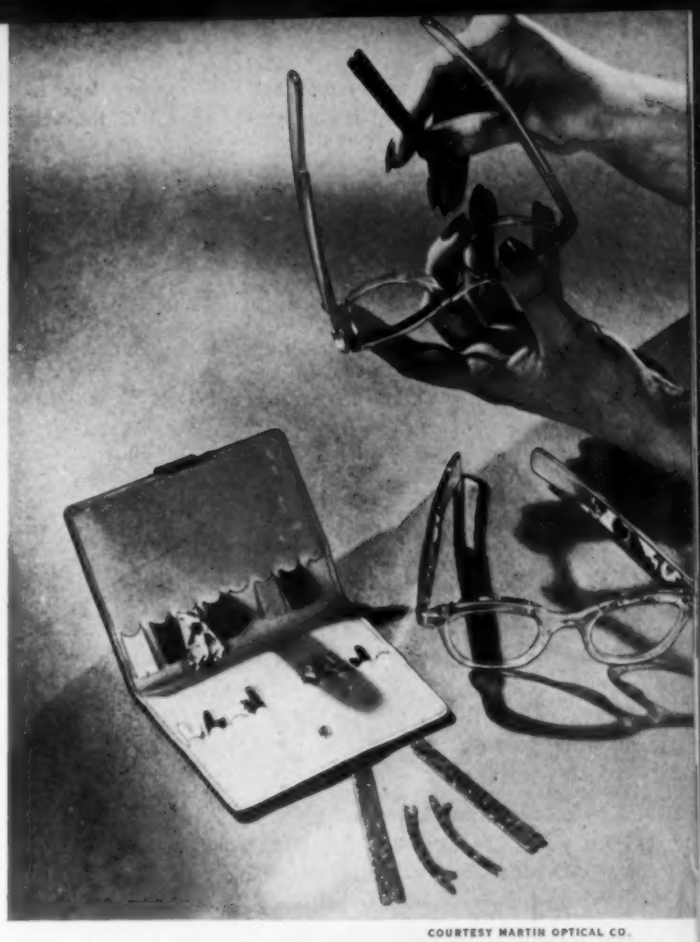
Cellulose nitrate ophthalmic frames are made in innumerable styles, colors, and sizes. The larger manufacturers try to make as few styles and colors as possible in order to avoid inventory problems. But consumer demands force them to diversify their lines in order to meet the competition.

The American Optical Co., Southbridge, Mass., for example, does not carry any of the more extreme styles or colors, but its line now includes over 50 styles and colors of Zylonite ophthalmic frames, with anywhere from 10 to 22 sizes in each style and color. An accompanying photograph of six American Optical Co. frames shows how two basic models can be varied. The addition of small metal medallions transforms a basic frame into the company's Decor model; adding a band of colored nitrate across the top of the same basic frame makes the model the company calls the Phantone.

Innovations in ophthalmic frames

These two models are rather conservative manifestations of the present vogue for decorative or "fashion" frames. More extreme decorative effects are obtained by metal-plating designs on frames, by fabricating frames of acrylic, or by using a laminate consisting of a fabric laminated between two layers of clear acrylic or cellulose nitrate.

Among the manufacturers of decorative frames is the Lu-Optic Mfg. Co., Brooklyn, N. Y. An accompanying photograph shows two of the company's plated frames. The striped design and the intricate sterling silver filigree effect shown are two of the many designs possible with a special process developed by the G.M.C. Process Corp., New York, N. Y. Lu-Optic also makes the plated acrylic frame and



COURTESY MARTIN OPTICAL CO.

Removable cellulose nitrate strips give transparent frames wide range of apparent colors. Note kit of extra strips

COURTESY BAY STATE OPTICAL CO.

New ophthalmic frames are injection molded of cellulose propionate. Note reinforcing rib molded into temple

Colorful decorative sunglasses are made by laminating fabric between sheets of transparent cellulose nitrate

COURTESY CELANESE CORP. OF AMERICA

Some sunglass frames are much like ophthalmic frames. Prescription sunglasses shown below are fabricated of nitrate

COURTESY BAUSCH & LOMB OPTICAL CO.

One-piece cellulose acetate butyrate sunglass lens is hinged to cap visor, can be pushed up out of the way

COURTESY POLAROID CORP.

COURTESY AMERICAN OPTICAL CO.

The "cosmetic effect" of contact lenses is shown by contrast between person wearing "inconspicuous" spectacles (above) and picture at right

the notched Plexiglas frames with the etched floral design shown in another photograph.[1]

Last month saw the debut of the latest wrinkle in decorative frames for women—a single frame, the color scheme of which can change as often as its wearer's wardrobe changes require. The frame, called the Chameleon, is fabricated of clear transparent cellulose nitrate or acrylic by Martin Optical Co., New York, N. Y. The color is provided by a set of four pieces of cellulose nitrate sheet which snap in place easily (one piece on the inside of each temple, and one above each lens). By changing these four pieces, which takes less than a minute, a woman can change the color scheme of her glasses to match her clothes. Thus the buyer gets, in effect, a wide variety of laminated frames for the price of one set of Chameleon frames.

The Chameleon comes with a pouch containing eight sets of color inserts, chosen by the buyer from the wide range of colors and designs available in nitrate sheet stock. Extra sets of inserts can be bought separately and the company plans to bring out new colors and designs to fit the changing styles in women's clothes. Celluloid material is used for the nitrate frames and all inserts, Plexiglas for the acrylic frames.

The new ophthalmic frames recently introduced by the Bay State Optical Co., Attleboro, Mass., are more conventional in appearance than decorative fashion frames, but actually represent a more radical departure from conventional practices. They are an innovation because they are made of cellulose propionate, because they are injection molded, and because of the method of inserting the lenses.

Forticel was chosen as the material for the frames because of its dimensional stability, easy moldability without weld lines, toughness, machinability, and high luster. The manufacturer claims that the Baylok frame is the first plastic frame designed so that lenses can be inserted as they are in metal frames—by removing the screw from the metal clevis (the decorative device which holds the split end of the frame together).

Sunglass frames

Sunglass frames are generally less conservative than ophthalmic frames. They vary more widely in style, color, price, and materials used.

Many of the higher priced sunglass frames are scarcely distinguishable from ophthalmic frames. They are fabricated of cellulose nitrate in conservative styles and colors, and they are marketed through the same channels as ophthalmic frames. In fact, the dividing line between ophthalmic frames and sunglass frames is straddled by products like the prescription Ray-Bans made by Bausch & Lomb Optical Co., Rochester, N. Y. Lower-priced sunglass frames are often injection molded of acetate.

Conspicuously decorative fashion frames for sunglasses, like ophthalmic frames, may be plated, fabricated of clear acrylic, or fabricated of laminated sheet stock. The plaid and checked sunglass frames shown in an accompanying photograph are fabricated by Comptone Co., Ltd., New York, N. Y. from Celluloid sheets laminated to fabric.

Among the innumerable styles of sunglasses on the market is one which holds the distinction of being the only all-plastic sunglass: the Sportglas, made by American Optical Co., uses a one-piece lens to cover both eyes. The lens, made by the Polaroid Corp., Cambridge, Mass., is a laminate consisting of a center layer of polyvinyl alcohol,

[1]For other examples of decorative frames see "Fashionwise glasses," MODERN PLASTICS, 25, 302-303 (October 1947).

Same person as at left, with contact lenses. Lenses are practically invisible; wearer can swim or take part in other sports with safety

COURTESY AMERICAN OPTICAL CO.

Contact lenses shown here are fabricated of acrylic. Rubber suction cup shown in center of case is used to remove lenses from the eyes

which acts as the polarizer, and two outer layers of cellulose acetate butyrate. The V-shaped nose piece, the top piece of the frame, and the temples are injection molded of cellulose acetate butyrate. A similar model is also made by Bachmann Bros., Inc., Philadelphia, Pa., and Wilson Products Co., Reading, Pa., under licensing agreements with American Optical Co., which is the exclusive distributor for Polaroid lenses for eyeglasses.

The same one-piece butyrate Polaroid lens which is used in the Sportglas is used in another way in the sun cap shown in an accompanying photograph. The lens is attached to the visor of the cap by a hinge and can easily be pulled into place in front of the user's eyes or pushed up under the visor out of the way. Polaroid sun caps are manufactured by Pioneer Scientific Co., New York, N. Y.; Bancroft Cap Co., Boston, Mass.; American Needle & Novelty Co., Chicago, Ill.; Portis Style Industries, Chicago; and George S. Bailey Cap Co., Los Angeles, Calif.

Glass Polaroid lenses, which are used in many types of sunglasses made by American Optical Co., also use plastics. The lenses actually consist of seven layers: 1) an outside layer of glass; 2) an adhesive; 3) a polarizing layer of polyvinyl alcohol; 4) a cellulose acetate butyrate support layer; 5) an adhesive; 6) an outside layer of glass.

Contact lenses

A large potential market for plastics in the ophthalmic field is in lenses themselves. Acrylic material is already being used for contact lenses, and many companies are experimenting with the same material for use in other types of lenses. Both of these applications may well account for a large volume of acrylic sheet stock and molding powder in the near future.

Contact lenses may someday capture a large portion of the market for prescription glasses because of what the ophthalmic industry calls their "cosmetic advantage"—that is, their appearance. This advantage is an important consideration to many people who have to wear glasses and who prefer to look as though they are not wearing them. The possibility of doing so is graphically illustrated by the accompanying photographs of a young woman wearing glasses and the same person wearing contact lenses.

In addition to their cosmetic advantage, contact lenses are valuable for athletic wear. They can be worn while swimming, playing tennis, or playing football, and they will not fall off, break, or become beclouded with perspiration. Less important from a volume sales standpoint, but more important ophthalmically, is the fact that such lenses can be used

Optically perfect acrylic lenses can be compression molded. Injection molding often causes striae near the flow lines

COURTESY BAUSCH & LOMB OPTICAL CO.

PHOTOS 1, 2, 3, 4, & 7 COURTESY AMERICAN OPTICAL CO.; 5, 6, & 8 COURTESY BAUSCH & LOMB OPTICAL CO.

1 Frame fronts are fabricated of cellulose nitrate sheet stock. Material is cut into strips and preheated. Fronts are then blanked out (above) with highly polished dies

2 Lens grooves are milled in the blanked out front. The speed of the cutting tool must be carefully regulated to prevent any "chatter" marks which would affect frame sizes

in certain cases where no other type of glasses would enable the patient to see (such as cornea transplant cases and cases of Keratoconus).

Despite these advantages, contact lenses have not yet found a wide market. One reason is their price which at present is well over $100 a pair to the consumer. Another consideration is that they cannot as yet be worn as constantly as can eyeglasses. The "tolerance period"—the longest time the lenses can be worn without discomfort—varies with individuals and often is as high as 10 to 18 hours. But the average tolerance period is between four and six hours.

A number of manufacturers have already entered the contact lens field. Most of them believe that further development work can overcome the price and tolerance period disadvantages. Sales of contact lenses have also been hampered by people's squeamishness about "putting things in their eyes." But most people can learn to handle contact lenses as easily as they handle the dental plates they put in their mouths.

The contact lenses shown are manufactured by American Optical Co. They are fabricated from acrylic sheet stock between 0.060 and 0.080 in. thick. The thickness used depends upon the amount of correction which must be ground into the lens. The lenses are cut out with a band saw, formed, then ground and polished. The prescription is ground into the center portion of the lens only. An acrylic material which cuts out ultra-violet light transmission is sometimes used for contact lenses.

Molded acrylic lenses

Another potentially large outlet for acrylic in the optical field may be opened by the experiments with molded acrylic lenses now being carried on by a number of companies. The main impetus to the experiments has been the desire to use a non-shattering material for safety goggle lenses. However, there is strong reason for believing that acrylic lenses will soon be used extensively for sunglasses, and even for ophthalmic purposes. Their main advantages over glass would, of course, be their relative unbreakability and light weight.

Bausch & Lomb has already produced optically perfect acrylic lenses in large quantities. But the company still considers the development in the experimental stage, mainly because of the unsatisfactory abrasion resistance of the lenses. The lenses are produced by compression molding in order to avoid the striae which result near the flow lines in injection molding.

The company finds that non-prescription lenses can be used just as they come from the mold without any finishing operations. Prescription plastic lenses have to be ground, polished, and edged to individual requirements. It is hoped that abrasive faults will be eliminated and the lenses will be on the market in the near future.

Similar experimental or development work with Plexiglas lenses is being carried on by the Amorlite Lens Co., Pasadena, Calif.; Watchemoket Optical Co., Providence, R. I.; Domar Products Co., Cleveland, Ohio; and others.

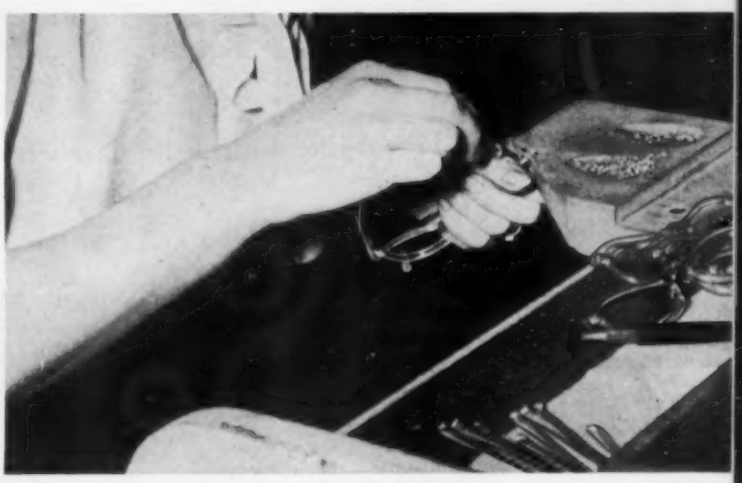
This survey shows the importance of plastics applications in the ophthalmic industry. Plastics are being used for nose pieces and temple pieces on rimless and metal-framed glasses. They are being used for frames for many prescription glasses and sunglasses. They are being used for Polariod sunglass lenses. And they are being used for contact lenses. Virtually all that remains in the field are the lenses which go into most spectacle frames. If and when plastics take over there too, most spectacles and sunglasses will be completely plastic.

EYEGLASS FRAMES

3 Frame is mortised to receive the hinge which is then pressed into the recess and riveted firmly into place. Thus the metal hinge will not loosen with ordinary wear

4 The original material is flat, but the finished frame must not be. Operator shown here is outsetting the bridge by bending the heated front with mated dies and high pressure

5 Drilling holes in temple pieces to accommodate screws or rivets which hold the hinge. Some temples have metal wire reinforcements driven into holes drilled lengthwise



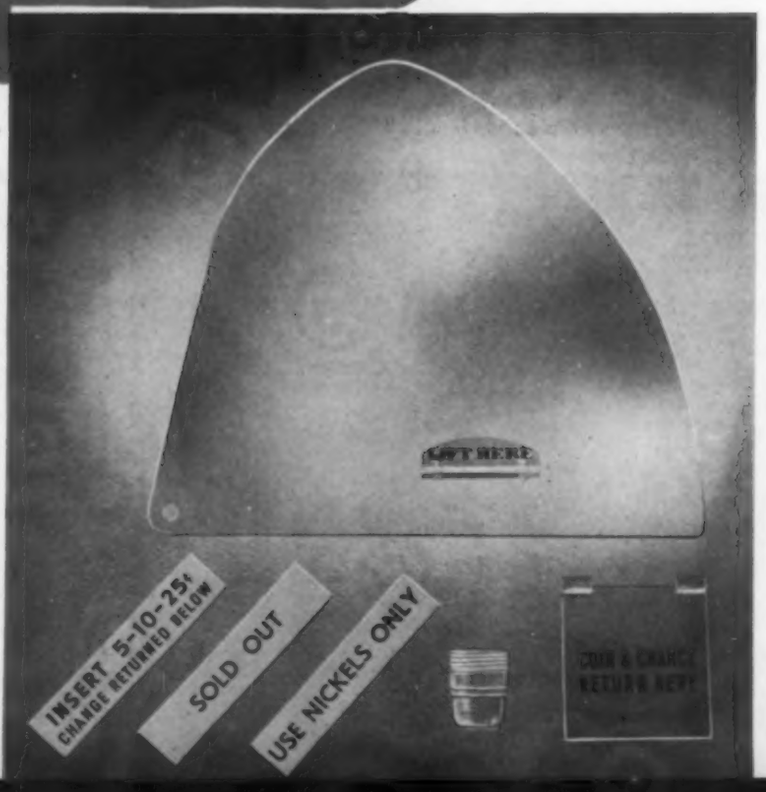
6 In assembly operation, temples are joined to fronts by screwing or riveting hinges in place. Accuracy is important so that finished frame will fit wearer correctly

7 One method of insuring accurate assembly is to mitre the front and the temples simultaneously to form the stop for the hinge. The jig used to hold frames is shown below

8 Final finishing operations involve a series of hand and machine operations. Careful polishing is necessary to give the frames a high luster without changing dimensions

VENDOR USES

Soft drink vendor designed especially for use in darkened theater interiors uses edge-lighted acrylic sign 16 by 26 in. to attract customers without annoying other theater patrons. Flavor labels are cellulose acetate; all other parts indicated above are fabricated from red, green, or transparent acrylic sheet stock



Right: The two-piece cup compartment door (top) and (left to right) three instruction strips, the spigot nozzle, and the coin return compartment door. Only one of the three instruction strips is back-lighted at any time. The light automatically switches from one strip to another when the machine runs out of change or drinks

PLASTICS INSIDE AND OUT

Carbonator head made of acrylic is less expensive, more accurate than stainless steel

SOFT drink vending machines, like juke boxes, must attract attention in order to attract coins. As a result, most of them tend to be garish. A pleasant exception to that rule is the "theater model" soft drink vendor manufactured by Spacarb, Inc., New York, N. Y.

This vendor is not gaudy, but it attracts attention effectively with edge-lighted and back-lighted acrylic parts.

Plastics are also used inside the machine. The syrup runs from the syrup tanks to the cooling unit through vinyl tubing, the carbonated water is mixed in a carbonator head fabricated of acrylic, and many of the electrical parts are housed in phenolic.

The machine vends soft drinks in paper cups, mixing the syrup and carbonated water from separate tanks as the drinks are sold. It handles three flavors and the buyer can make a selection of any flavor, any two of the flavors in any desired proportion, or all three of the flavors in any desired proportion. The mixing feature is patented by Spacarb. The machine also accepts nickels, dimes, or quarters and returns the correct change.

The problem in designing this particular model was to make it conspicuous enough to be seen by prospective customers without lighting up the darkened theater. The design problems were worked out by the engineering department of Spacarb.

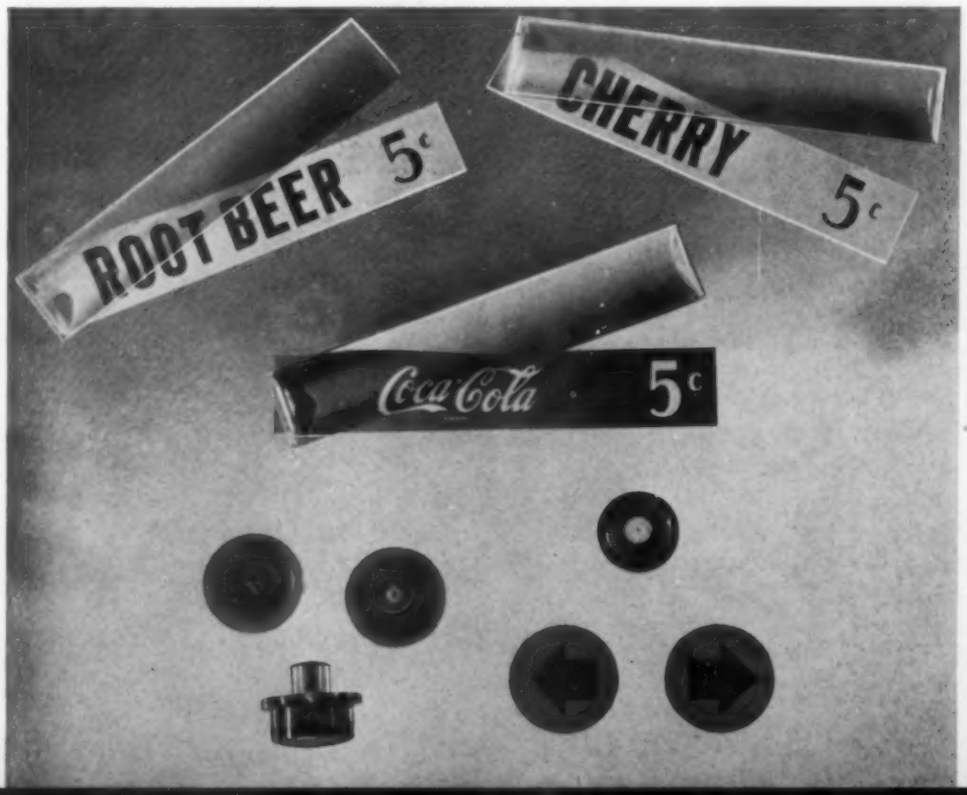
Exterior applications

The most conspicuous of the exterior applications of plastic is an edge-lighted acrylic sign 16 by 26 inches. The sign contains the words "Serve Yourself" and the Spacarb trade mark. Two 8-watt fluorescent tubes under the sign provide the necessary light to bring out the lettering. Bodnar Radio Laboratories, Tuckahoe, N. Y., fabricates the signs from ¼-in. thick acrylic sheet.

The same fluorescent tubes which light the main sign also light the instruction panel, coin slots, and control buttons. Two acrylic windows below the tubes allow the light to reach the lower part of the face of the machine—and prevent theft of the fluorescent tubes.

The instruction panel is metal, but it contains two red acrylic arrows. One, which points to the coin slot, is back-lighted until a coin is put in the slot. Then the light goes out and the other arrow, which points to the flavor selector buttons, lights up.

The panel also has three translucent acrylic strips which are lettered in red. The top one, which is normally back-lighted, reads, "Insert 5-10-25¢, change returned below." If the machine runs out of change, the light behind that strip goes out and a



Left: Cellulose acetate flavor labels and convex rectangular acrylic lenses (top). Three flavor selector buttons (bottom left) are made of transparent red acrylic, as are the instruction panel arrows. Coin return button (so labeled in gold) is transparent green acrylic

"Use Nickels Only" strip lights up. If the machine runs out of merchandise, a "Sold Out" strip is lighted. A transparent green acrylic coin return button is also on the instruction panel.

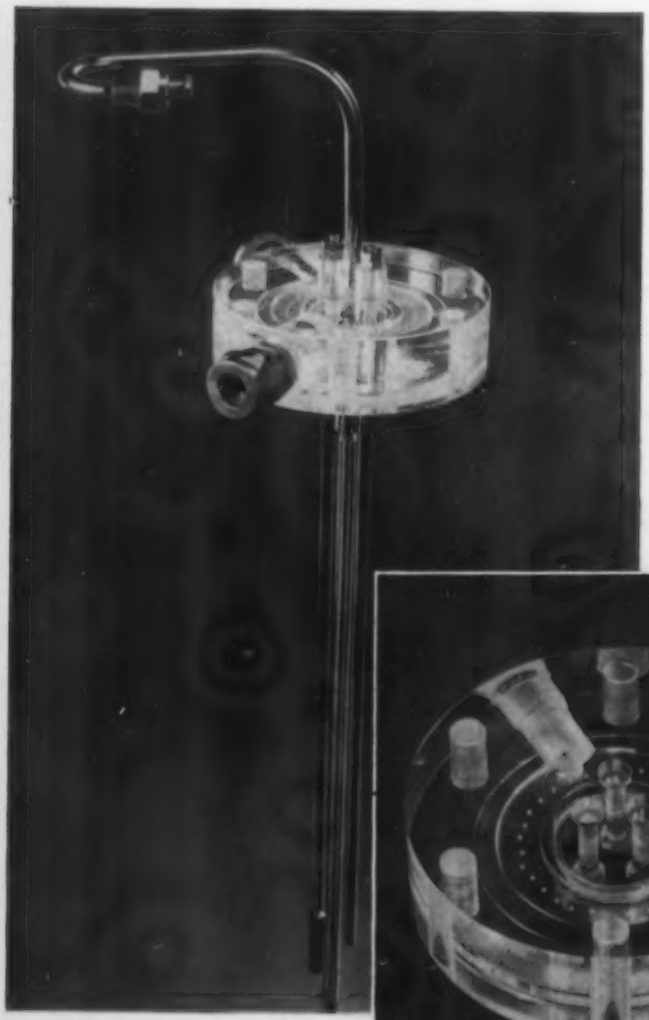
The flavor selector buttons are fabricated of transparent red acrylic. The flavor labels, or "advertising strips," are cut from cellulose acetate sheet and are placed behind rectangular convex lenses fabricated of clear acrylic.

The cup compartment, where the soft drink is actually delivered, has a clear acrylic door which can be tilted out of sight by lifting a handle which is also fabricated of clear acrylic. The coin return compartment has a clear acrylic door which is hinged at the top. The coin return door and the handle of the cup compartment door have lettering hot-stamped on them in gold and black, respectively. The spigot nozzle above the cup is also clear acrylic.

All of the above-mentioned plastic parts (except the large sign) are fabricated for Spacarb by Sirlou Plastics, Waterbury, Conn.

Acrylic was used for most of the exterior parts of the Spacarb theater model because of its transparency, light-piping qualities, or appearance. The interior of the machine offers an example of the use of the same material for a completely functional part, the carbonator head.

Carbonated water is mixed in acrylic part and sprayed into tank (not shown). Metal electrodes control level in tank



Functional acrylic part

The carbonator head mixes carbon dioxide and water to form the carbonated water which is later mixed with the flavor syrup to make a complete drink. Carbonator heads have to be made of a chemically inert material, and stainless steel is usually used in vending machines. Spacarb found that the forged stainless steel carbonator heads were expensive, and that the tolerances of plus or minus 0.002 in. caused a reject rate of 30 percent.

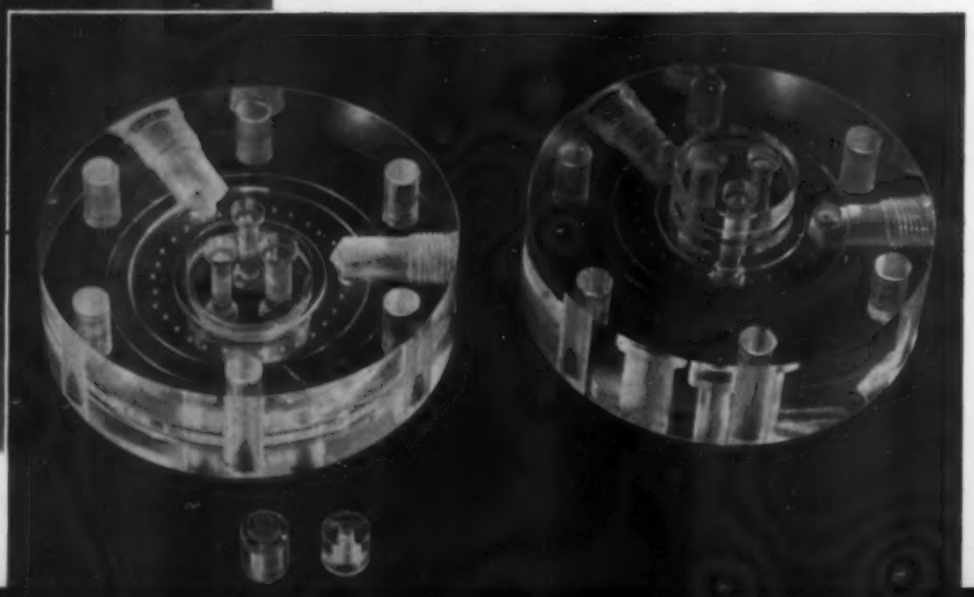
When the company shifted to acrylic, substantial savings were effected and the reject rate dropped to less than 5 percent. In addition, the acrylic heads are good electrical insulators. This is important because two electrodes, which control the level in the carbonated water tank, must go through the carbonator head.

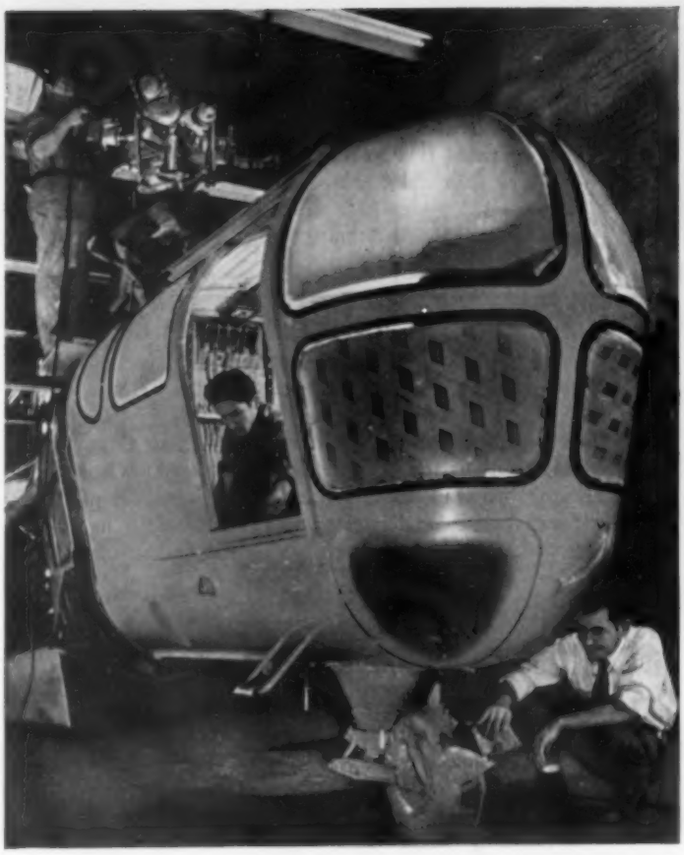
There are two intake holes in the side of the carbonator head—one for the carbon dioxide and one for the water. From the intake holes, the ingredients are fed into a ⅛-in. deep ring-shaped channel about ½-in. wide and 2¾ in. in outside diameter. In this small space, the carbon dioxide and water combine to form carbonated water.

There are 32 holes, each about 1/32 in. in diameter, in the bottom of this channel. The carbonated water comes out of these holes in a fine spray and drops into a tank. Three holes in the center of the carbonator head accommodate the two electrodes and the pipe through which the carbonated water is forced out of the tank. There are six other holes for the bolts which hold the head in place.

The carbonator heads are fabricated by Sirlou Plastics and by Mastercraft Plastics Co., Inc., Jamaica, N. Y.

Below is top view (left) and bottom view of acrylic carbonator head. Two small parts are electrode bushings





COLOR PLATES COURTESY UNITED AIRCRAFT CORP.

Acrylic windows for helicopters and cockpit canopies for other types of aircraft are fabricated in plane manufacturer's plants. Final finishing operation is shown here

Four-place helicopter uses over 13,000 sq. in. of acrylic sheet in four different thicknesses. Masking protects the acrylic windows while the helicopter is being spray-painted

Acrylic in Helicopters

Plastics have a stake in the helicopter's bright future because a single craft may use more than 37 lb. of acrylic

UNLIKE conventional aircraft, the helicopter can go straight up, come straight down, hover, or fly backwards. Thus it can perform many jobs—such as rescue missions, crop dusting, pipeline inspections, etc.—more efficiently than any other type of aircraft. For this reason, most aviation experts predict a brilliant future for the helicopter. And that means a market for large quantities of acrylic sheet.

Most modern aircraft use some acrylic. But the helicopter, which can fly in almost any direction, must have visibility in every direction. As a result, most helicopter designs are characterized by the liberal use of transparent acrylic to form a "greenhouse" type of cockpit.

A good example is the four-place S-51 helicopter made by the Sikorsky Aircraft Div., United Aircraft Corp., East Hartford, Conn. The S-51, shown above, uses over 13,000 sq. in. of Plexiglas weighing more than 37 pounds. In the illustration at the top of this page, the Plexiglas is masked to protect it while the rest of the helicopter is being spray painted.

Four different thicknesses of Plexiglas are used in each helicopter. The particular thickness used at any point depends upon the stresses at the point of installation. The S-51 thus uses 13 lb. of 0.125-in. sheet, 9.6 lb. of 0.110 to 0.140-in. sheet, and 9.64 lb of 0.100-in. material. The S-51 also has 4.95 lb. of green acrylic sheet installed above the pilot to protect his eyes from the glare of the sun. The green sheet used is between 0.100 and 0.125 in. thick.

Comparable amounts of acrylic are used in Sikorsky's two-place S-52, and the XHJS-1, made for the Navy. Last year Sikorsky made 74 helicopters of the three types. That production, which is small compared to future possibilities, used 8202 sq. ft. of acrylic weighing 4730 pounds.

This poundage plus the acrylic used for the cockpit canopies of conventional aircraft makes United Aircraft Corp. a large-scale plastics fabricator. All the necessary forming and finishing is done in the company's own plants. The operators shown above are trimming and polishing an acrylic piece.

Annual Conference, S.P.I.

In these columns are given abstracts and summaries of papers presented before the Annual Convention of the Society of the Plastics Industry, Inc. Also presented is a resume of the session on Plastics Films, Sheeting, and Coated Fabrics Division. The convention was held on May 21 and 22 at the Ambassador Hotel, Atlantic City, N. J.

GENERAL MEETING

Chairman, Nelson E. Gage,
American Insulator Corp.

ECONOMIC TRENDS OF TODAY

by Leo M. Cherne, The Research Institute of America, Inc.

AS far as the economy at large is concerned, a recession would indeed be a very unlikely development within the months to come. We are moving into a military appropriation which in one year will, if it reaches its peak, spend more than the total emergency expenditures of the New Deal throughout its entire depression history. That is what I have in mind when I say that the possibilities of recession are dim indeed.

The very same committees in Congress which were responsible for the tax cut which you are beginning to enjoy have already conducted informal discussions concerning the restoration of an excess profits tax in 1949. It is not possible today to anticipate in any great detail what the contour of the next revenue act will be except that it will be larger.

THE MOLDER BELIEVES IN MERCHANDISING

by W. R. Dixon, assistant sales manager, The Dow Chemical Co.

THE foundation on which mass production is based is the creation of mass demand. Since plastics is a mass production business, mass demand for plastics products must be built. The basis of Dow's campaign of merchandising, which has received splendid reception from molders and buyers, is the recognition of the crying need for discrimination between good items and poor items. The purpose is to educate the consumer to recognize good plastics articles which he may buy with confidence.

When a product has received the Evaluating Committee's approval, it enjoys the supporting prestige of Dow's national advertising program and its informative labelling program. Both retail buyers and consumers are interested in buying plastics products. The program has helped them to buy with confidence.

OVERSEAS MARKETS

by Tino Perutz, Omni Products Corp.

I DO not foresee a continued important demand for molded products abroad. Inevitably, manufacturers of molding equipment will find customers abroad. European and Oriental tastes and trends will be better judged from the local point of view, and many of the final molded items will roll off American machinery in foreign hands.

But the machines employed abroad will not invariably be of American manufacture. There is competition and there will be competition to a greater extent as English industries gradually revert to normal. However, in the field of many basic compounds, basic synthetic resins, and their ingredients, I believe we can look forward to a vast and stable market.

PLASTICS POTENTIALS

by Ephraim Freedman, director, Macy's Bureau of Standards

RETAILERS are the buying agents for the community, but to serve their communities best they must also be in partnership with manufacturers of consumer goods. They must be alert to the needs of the public and must channel back to manufacturers the results of consumer experience.

The most pressing current problem revolves around the indiscriminate use of reprocessed material and failure to label such merchandise so that retailers and consumers will

(*Please turn to page* 162)

Officers of the S.P.I. for 1948-1949, elected at the Annual Meeting. Top row, left to right: J. J. B. Fulenwider, Hercules Powder Co. Inc., treasurer; Norman Anderson, General Molded Products, Inc., secretary; Gordon Brown, Bakelite Corp., vice-president. Bottom row: Neil O. Broderson, Rochester Button Co., chairman of the board; George H. Clark, Formica Insulation Co., president. Sectional directors elected were: Irving D. Wintrob, M. Wintrob & Sons, Ltd., Canadian Section; Horace Gooch, Worcester Moulded Plastics Co., New England Section; Ralph David, Pacific Plastics Magazine, Pacific Coast Section; C. N. Sprankle, Sandee Manufacturing Co., Midwest Section. Industry division directors are: Monroe L. Dinell, Clover Box & Mfg. Co., fabricating; F. W. McIntyre, Reed-Prentice Corp., machinery; F. J. Groten, Firestone Plastics Co., films; N. J. Rakas, National Automotive Fibres, Inc., engineering and technical. Directors at large are: Nelson E. Gage, American Insulator Corp.; J. L. Howie, Jr., The Grigoleit Co.; J. E. Gould, Detroit Macoid Co.; D. S. McKenzie, General Electric Co.

SEEN Through Rigid Plastics Sheets

by R. C. EVANS

THIRD OF A SERIES OF THREE ARTICLES ON PLASTICS IN PACKAGING

LAST year some 10,000,000 lb. of rigid, transparent sheet plastics were used for packaging . . . and for good reasons. One of the reasons, during that year, was the desire of many manufacturers to use a material which would help to put their products in a luxury class because the greater saving and earning power of the consumer was boosting luxury sales. But even last year, when demand for most non-durable goods still exceeded the supply, the packaging uses of these plastics sheets—cellulose acetate, ethyl cellulose, styrene, and vinyl—increased because they had long since proved their ability to speed turnover of goods at the point of sale.

Now that the economic pendulum is swinging back toward the time when supply is beginning to equal and even exceed demand, manufacturers, jobbers, retailers, and distributers are looking for methods of stimulating sales. Transparent packaging has proved its effectiveness in doing just that.

Nearly everyone is familiar with the success story of cellophane, but few realize that this transparent wrapping material enjoyed its greatest growth during the depression years of the '30s, despite the fact that it was priced six, seven, and even eight times as high as the materials with which it competed. In many cases the protective properties of cellophane were no more effective than competing, less expensive materials, but it was transparent and hence way out front in its merchandising and sales value. "Wrapped in Cellophane" became the almost universal cry of advertisers before the depression ended, as they sought to increase sales by using this packaging medium. And just as cellophane proved an effective sales booster, so has *rigid* transparent packaging material, which can package items impossible to wrap in transparent film.

Cost comparisons

Viewed against this background of accomplishment, it is obvious that rigid transparent materials for packaging can do a real job for industries manufacturing packageable goods in the premium or near luxury class, despite the fact that today's prices —all prices—are too high. When a manufacturer is considering rigid transparent material, he is inclined to compare the cost of this product with boxboard or other materials of lower cost. But this is not a true or fair measurement of packaging value. The measure should be not in terms of money alone; full consideration should be given to what the package can accomplish in terms of turnover and resultant profit.

We realize, of course, that during the various markups between the manufacturer, jobber, and retailer, the package is marked up as well as the product. If the cost of a package is 4¢ and the cost of a product is 41¢, the retail price may then be $1. At this level we recognize the fact that 9¢ is now the cost of the package to the consumer.

It cannot, however, be arbitrarily stated that this price is too high. We must first determine how good

The Author: Richard C. Evans, manager of the packaging materials and sheet sales department for Monsanto Chemical Co.'s Plastics Div., has devoted most of his working career to the field of packaging. Upon joining Monsanto in 1940, his first assignment was to development work for Vuepak packaging material in the Detroit, Chicago, and St. Louis territory. Since that time, he has been branch manager for the Plastics Div. in St. Louis and assistant sales manager for the sheet and vinyl resins department. He has headed up the packaging sales department since it was inaugurated in January, 1946.

A native of Hazelcrest, Ill., Mr. Evans gained his early education in Evanston, Ill., and received a B.S. in Business Administration from Northwestern University in 1928.

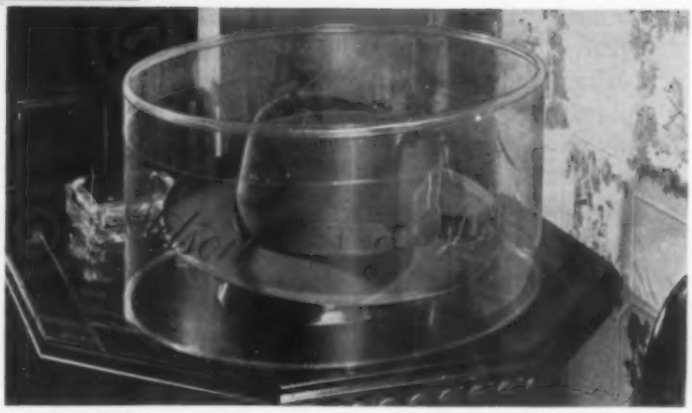
Completely transparent package for woman's handbag is formed of rigid Kodapak sheet material. It allows customers to see the product, but keeps it clean and prevents the bag from becoming shopworn. Package can also serve as a simple display

a job the package is doing in selling the product. For example, when a candy product was sold in a chipboard container at 85¢, it had a turnover rate of approximately eight times a year—that is, the dealers sold an average of eight times their basic stock each year. The candy was then switched to a transparent cellulose acetate package, and though the initial cost of the package was higher, the turnover and sales doubled despite a new retail price of $1. The consumer paid the higher price for the same amount of candy, but apparently paid it willingly. Greater sales because of eye appeal, quality inference, convenience, and visual inspection can support high initial costs, if the unit profit is not too badly disturbed. Even if the goods were sold at the same price, the faster turnover would tend to decrease expenses and would eventually result in greater profit.

Another facet of the packaging price situation concerns manufacturing economies. It may at first sound like double talk, but a manufacturer recently stated that, although the intial price he paid for a new package was higher than for the old, his over-all packaging costs were lower due to economies in filling—and his sales increased by 35 percent.

Box making machinery

The cost of rigid transparent containers is being greatly reduced by the development of automatic box making machinery. There are several concerns producing this type of equipment, including the American Tool Works, Cincinnati, Ohio; the Taber Instrument Co., Buffalo, N. Y.; and Harco Industries, Inc., Rochester, N. Y. There are also fabricators of transparent containers who have developed their own equipment, some of which makes boxes which can be shipped flat, similar to folding chipboard containers. Outstanding in this field are the boxes made by the Interstate Folding Box Co., Middletown, Ohio; by Plastic Artisans, Inc., White Plains, N. Y.; and by Troth-Bright-Page of Philadelphia, Pa.



COURTESY BAKELITE CORP.

Stetson hat box is made of rigid vinyl sheet by Croasdale and DeAngelis, Inc. Note how bottom of box has been blown into dome shape so that hat brim does not rest on bottom

It is interesting to compare the packages produced by these three companies. Boxes by Interstate combine cardboard, Scotch Tape, and cellulose acetate. The Scotch Tape forms hinges which allow the acetate to be folded; the cardboard forms the ends. The Plastics Artisans' box is formed of two separate pieces—a cardboard base and a domed, cellulose acetate top. The Plastafol boxes produced by Troth-Bright-Page are all transparent and are manufactured from a lamination of cellulose acetate and vinyl film. The vinyl film allows the material to be bent sharply at the corners.

While the three products are dissimilar, the results are the same: set-up transparent boxes that can be shipped flat, requiring less storage space than non-folding boxes. And, more important, they

are machine produced and cost less than most transparent boxes which are produced by methods involving a high percentage of hand labor.

Merchandising cannot be classified as an exact science, nor can the slide rule be applied to a given set of facts. We are, however, aware of certain basic factors which influence women's buying habits. Thus, a lower price is not always the determining factor. Mrs. Consumer may walk four blocks to save three cents a pound on a roast, yet she will spend $15 on what may be a male's conception of a silly combination of fur and feathers but which she and the milliner call a hat.

We also know she buys on impulse—that eye appeal is stronger than ear appeal. Rigid transparent packaging material allows the product to be fully inspected yet it is protected against the effects of handling and dust. A plus value is the quality inference which transparent plastics give to a product.

COURTESY PLASTICS DIV., MONSANTO CHEMICAL CO.

Three-piece acetate perfumizer package is made by Transparent Specialties

COURTESY CELANESE CORP. OF AMERICA

Blanket swatches in acetate container go with gift certificate for Chatham Mfg. Co. blanket

Transparent packages fall into these three general classifications:

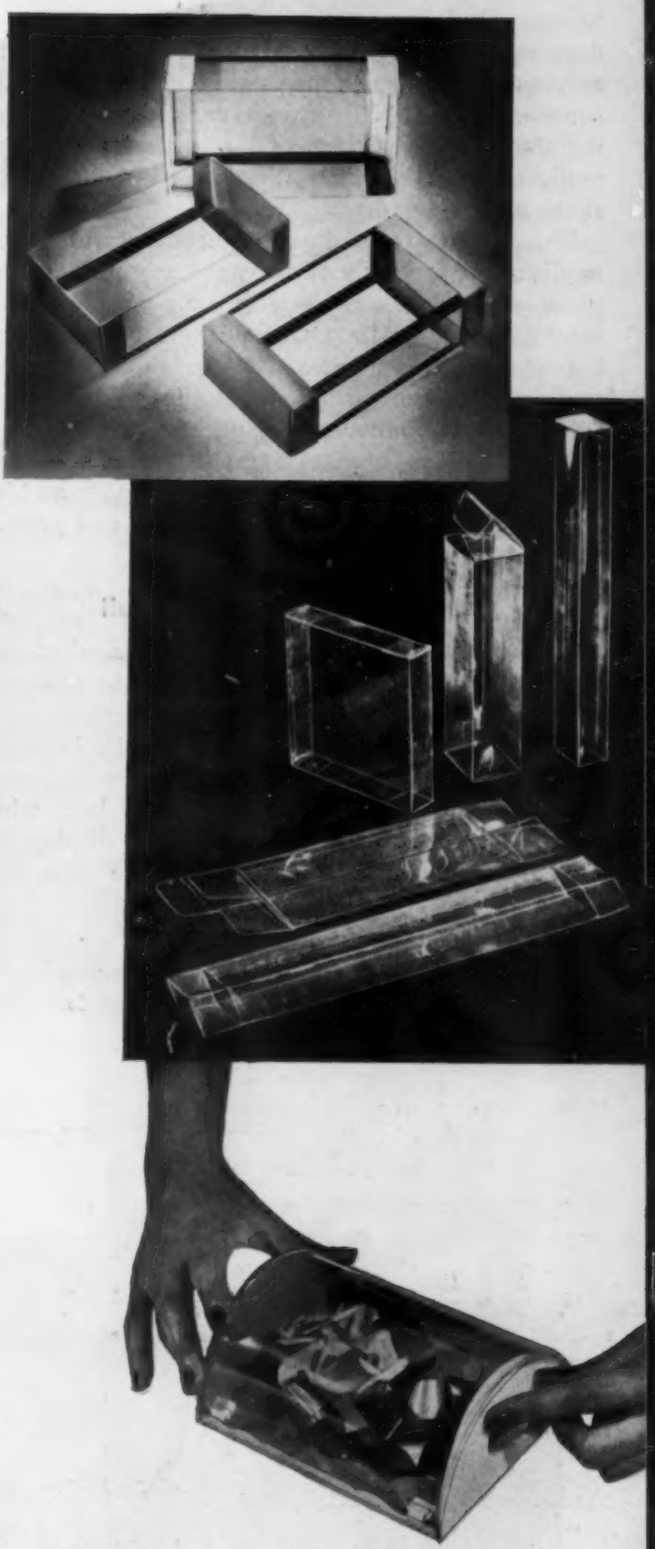
The 100% transparent package—Packages in this category permit a product to be inspected from all sides; there is no opaque material to hinder observation.

Combination of transparent and opaque materials—In this category are rectangular, cylindrical, and other shaped packages having cardboard bases and transparent tops, or other combinations, to allow partial inspection. At the same time, the strength of the package is increased and the initial cost of the container is reduced.

Display containers—Here the container is more than a package; it holds several unit products which can be sold individually from the display.

For example . . .

Among outstanding examples of the completely transparent package are the DeVilbiss perfumizer



PHOTOS COURTESY PLASTICS DIV., MONSANTO CHEMICAL CO.

Some transparent plastic boxes can be shipped flat like folding chipboard containers. Three examples described in text are those fabricated by (top to bottom): Interstate Folding Box Co., Troth-Bright-Page, and Plastic Artisans, Inc.

and the box for Chatham blanket samples and gift certificates. Ninety packages were studied and 14 fabricators were contacted before DeVilbiss decided to use cellulose acetate in two drawn spheres. In drawing acetate there is always the problem of removing the flash since the original sheet is generally square. In the DeVilbiss package, instead of removing the flash right to the edge of the sphere, normally a painstaking job, it was die cut into a star shape after being drawn.

This package also illustrates another interesting application of a fully transparent material. A thin piece of cellulose acetate with a die-cut hole in the center, the same size as the perfumizer, is inserted between the two spheres. The perfumizer is placed in this hole. The result is that the product seems to float in the center of the package.

The Chatham blanket sample package, entirely different from the DeVilbiss job, illustrates an ideal method of merchandising a bulky unit and promoting it as a gift candidate.

Display boxes sold at retail

Manufacturers of men's hats have also adopted the 100% visible package. In addition to miniature hat boxes as gift offerings, they have made use of standard size hat boxes for display units in stores. Reports from one manufacturer indicate that many customers purchase the standard size box, which originally was intended only for store display. Retailers report the large hat boxes are sold, as a general rule, only when the wife accompanies the husband when he is purchasing the hat—testimony again of the impulse-sales-getting value of transparent packages.

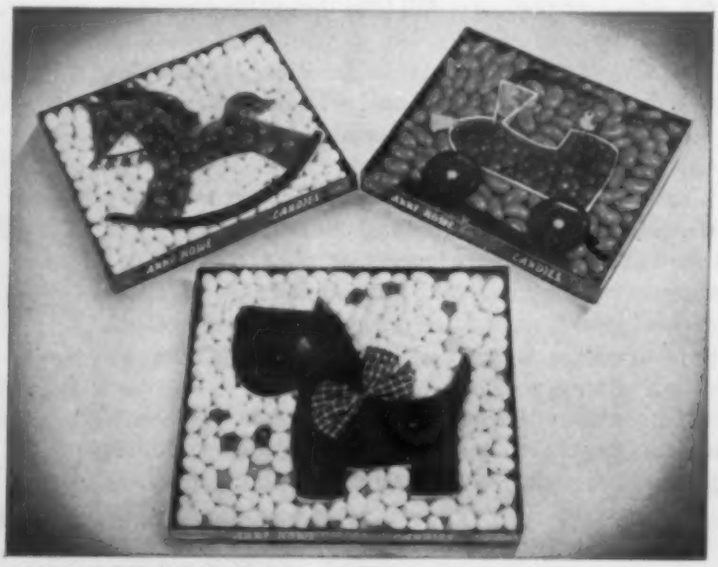
In still another field, George V. Clark Co., New York, N. Y., has developed an all transparent package, in the shape of the conventional knitting yarn tube, for General Electric heating pads. The quality inference which the package lent to the product was enhanced when seven of these packages were combined in a counter display by the manufacturer.

Use of transparent cellulose acetate, in combination with cardboard, enabled Howe Products Inc., Chicago, to offer an entirely new product. The company was in the bulk candy business and competition was keen. The idea was conceived of packaging the candies in such a way that the varied colors could be used to form a picture. The combination cardboard-acetate box was developed; the acetate top permitted the customer to see the picture, and impulse buying made the new product a fast seller. Such packaging ideas move the product into the gift and novelty classification and generally permit the retail price to be raised sufficiently to cover the extra packaging costs, without adversely affecting sales. In this case, and in many another, the unusual form of the packaging increased sales by large percentages.

Package shows main feature of doll

Manufacturers of the Curly Top doll experienced considerable difficulty in merchandising their new product until they converted to a rigid transparent acetate package combined with cardboard. The main feature of the paper-doll-with-clothes item was "real" hair on the doll in place of the usual printed

Heating pads packaged in clear cellulose acetate containers make effective counter display. Boxes by Geo. V. Clark Co.



COURTESY CELANESE CORP. OF AMERICA

Colored candies are arranged to form a picture, then packaged in clear acetate imprinted with details of the design

hair. Retail clerks had considerable difficulty in selling the product because they could not display this main feature. When the switch was made to the package which permitted the article to be viewed without being soiled, sales went up tremendously.

The new container for Topps Party Pak chewing gum—a set-up box base, with colorful designs, and a transparent acetate cover—is "taking the lid off" of conventional gum merchandising methods. By encouraging gum sales to the tune of 45 sticks instead of a few at a time, the item becomes a party accessory, a gift item, or almost a household staple. Impulse sales result from displaying the package on the retail counter, yet the package is pilferproof.

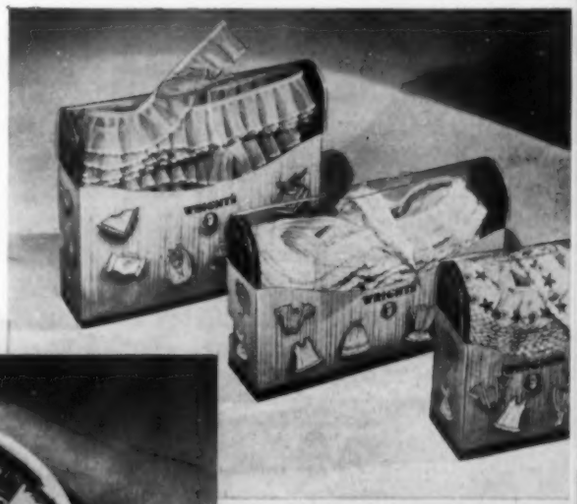
Transparent packages for greeting cards have been a boon to the retailer and manufacturer alike. Dog-eared and finger-marked cards can't be sold, but the customer won't buy greeting cards without seeing them. Hallmark solved its problem with a large paperboard box, 14½ by 12 by 3 in., with a holly-red top that is protected by a tightly fitting over-jacket of cellulose acetate. The display contains eight packets of 12 cards each. Each packet has its own separate acetate top with a metal foil covered set-up box tray. The unit is a good display and the retailer is offered insurance against losses from handling while the customer is permitted to view the merchandise.

Display dispensers

The display dispenser classification practically disappeared during the war, but the retailer's need for it is once more becoming evident. An excellent application of this type is W. E. Wright's package for ruffling. The problem here was to develop a dispensing unit which would allow a certain amount of visibility, yet offer material protection, all at an initially low cost, since the ruffling material is in a highly competitive field. Three size packages were developed—each for a different size ruffling.

The Wright package consists of a lithographed cardboard base and a domed, transparent cellulose acetate top. The ruffling is drawn through a slot in the top of the package—and the clerk cuts off the desired length with no chance of soiling the ruffling remaining in stock. After a portion of the ruffling is sold, the last few yards remaining in the container can be pushed upwards and held in place so that the merchandise will be visible practically to the last inch. The package-display is a one-trip container; it is discarded after the ruffling is sold.

These are but a few examples of hundreds of successful applications of rigid plastics sheet to the packaging field. And the field will continue to grow, probably in direct proportion to increases in machine fabrication of the packages. Completely hand made packages—all that could be found a few years back—still have their place in the packaging field, but only for small runs and only where the pricing of the item being sold permits the extra cost. The advent of machines to convert the transparent packaging materials into packages enables the manufacturer whose pricing is closer, or who needs exceptionally large runs, to use transparent packaging as his medium of increasing sales and turnover.



Display dispenser type package for ruffling is made in three sizes. Base is lithographed cardboard, top is transparent cellulose acetate

COURTESY PLASTICS DIV., MONSANTO CHEMICAL CO.

Paper dolls with "real" hair sell better when packaged in acetate box which shows off that feature

COURTESY CELANESE CORP. OF AMERICA

Clear cellulose acetate-topped package contains 45 sticks of chewing gum. Box made by Milprint, Inc.

Polyester Laminate Announced

ONE answer to the question of what has happened to long-promised civilian applications of polyester low pressure laminates is given emphatically by United States Rubber Co. in its announcement of Satusply, a laminate for wall coverings as well as for use on horizontal surfaces. After 18 months of field testing, and with plentiful production capacity, company officials are satisfied that they now have a polyester laminate that will live up to the promises made for this highly ballyhooed plastic material of the late war period. The company has established widespread outlets among distributors with extensive application experience who will furnish assistance and instruction to users.

Satusply is polyester-impregnated, high-quality absorbent paper or fabric, processed under heat and tension. Various styrene-based polyester resins are used, depending upon the finished product's intended application. The material is produced in 34 different colors and patterns and is not limited to a glossy finish, which was one of the handicaps in similar materials when polyester laminates were first brought out. It is made in continuous rolls of several widths and up to six-ply thickness.

The laminate can be manually applied on the job without mechanical pressure. No case of delaminating has been reported after extensive use testing. The company is also producing a special cement, called Satusply-Sement, to bond the material to the base surface, which may be plaster, plaster board, metal, Masonite, Transite, finely sanded plywood, marble, or glass. Company spokesmen say there is no relationship between Satusply and their previously produced V-Board, except that the same resins are used.

Because of its flexibility, washability, and stain-resistance, Satusply is expected to be particularly applicable for wall coverings in rooms and corridors, furniture surfacing, and tops for tables, counters, and desks where permanency is desired.

Although available in either rolls or sheets, the laminate is generally provided in roll form, as:

Grade	*Thickness*	*Width*	*Length*
Y-Type (Cigarette Proof)	0.025″	24″ 30″ 36″	60 ft.
X-Type Horizontal	0.030″-0.040″	24″ 30″ 36″	60 ft.
X-Type Vertical	0.020″ 18″	30″ 36″ 48″	90 ft.

Heat resistance: Boiling water may be poured directly on the surface with no effect on the serviceability of the product. Heating elements, such as flat irons, however, should not be rested continuously on Satusply.

Cleaning: Detergents, alkalies, cleaners, soap and water, or ammonia may be used to clean Satusply. Scouring powders containing grit should not be used because they will cause glossy surfaces to become dull over a period of time. Although resistant to most chemicals, Satusply is not resistant to hot concentrated alkalies.

Soaking in water: Cigarette-proof grade Satusply cannot be soaked in water without softening the bond to the aluminum foil contained inside. However, no damage will result to cigarette-proof Satusply from contact with water against the surface when it is used as intended.

Aging resistance (durability): Light fading; Satusply withstands 100 hr. in standard Fadeometer (ultra-violet) tests with negligible effect upon its appearance. Atmospheric effects; exposure to extremes of atmospheric conditions in standard Weatherometer tests for 100 hr. produces negligible effect. There is no evidence of checking or deterioration in physical properties.

COURTESY U. S. RUBBER CO.

Shown at extreme left is Satusply, the new type decorative material that is suitable for wall coverings as well as horizontal surfaces. The material is made in continuous rolls. Other photo shows how the material can be used on corved surfaces and in corners

Rubber or Plastics?

The second of two related articles. This section deals with the high styrene-butadiene copolymers and the status of raw materials used by both the plastics and rubber industries

COURTESY BAKELITE CORP.

Colored vinyl overshoes for children are something new in plastics, now entering a field dominated by rubber

THE development of GR-S general purpose synthetic rubber and its relation to plastics insofar as rubber products are concerned was pointed out in our June 1948 number, page 89. That was only part of the story. The use of the ingredients, styrene and butadiene, from which synthetic rubber is derived, to prepare a product which is not a synthetic rubber is of equal interest to the plastics industry. To make general purpose GR-S rubber, the mixture is charged with approximately 29 parts styrene and 71 parts butadiene, and the conversion process is stopped when about 70% of the mixture is converted to polymer. If conversion is stopped at some other point, the resulting compound has different properties but remains a rubber-like material with commercial value.

However, when the charged mixture contains a much greater proportion of styrene than butadiene, a quite different end product is obtained. It is a hornier, harder resin type substance but at ordinary temperatures has almost none of the elastic qualities of rubber. When modified with other monomers or chemicals of different types, a variety of resins with a wide range of the properties and characteristics of other thermoplastic resins is derived. They are particularly noted for their toughness, high impact strength, and high heat resistance. At least one of these modified resins has already been announced which developers say will withstand 230° F., and which is claimed to possess an impact strength great enough to make the material suitable for automobile fenders, suit cases, safety helmets, and similar applications. Trade names and company sponsors of high styrene-butadiene materials which have received the most publicity to date are, in alphabetical order:

Butaprene SL or SD — Firestone Tire and Rubber Co.
Darex — Dewey and Almy Chemical Co.
Goodrite Resin 50 — B. F. Goodrich Chemical Co.
Kralac — Naugatuck Chemical Div., U. S. Rubber Co.
Marbon S and S1 — Marbon Corp.
Pliolite S3 and S6 — Goodyear Tire and Rubber Co., Inc.

Interest centered on styrene

There are several other companies, such as Dow Chemical Co. and Monsanto Chemical Co., working with high styrene copolymers who would naturally be interested because of their familiarity with and large-scale production of styrene monomer. In most cases, the non-rubber companies are more interested in other copolymers than those containing substantial quantities of butadiene. Plexene, for example, is styrene copolymerized with another material which Rohm and Haas, the producers, have never disclosed. Monsanto's Cerex is another example. Enjay Co., Standard Oil Co. of New Jersey's chemical division, is marketing a styrene-isobutylene copolymer known as "S" polymer which is reported to be somewhat similar in application to polyethylene polymers. It has a broader softening range, mixes well with waxes, is easily processed, has low vapor transmission, and is attractive for packaging.

There are doubtless many other of these *new* high styrene copolymers whose producers have kept mum. There are so many possibilities and so many companies working on them that developers maintain strict secrecy in the hope that they will be the first to market with a new and successful compound in this family of resins. Furthermore, very few of the resins have been thoroughly tried for any great length of time in any but a few applications, and developers are cautious lest they create a prelimi-

COURTESY GOODYEAR TIRE & RUBBER CO., INC.

In rubber or mineral filled flooring, styrene-butadiene copolymers act as reinforcement agents, permit better color, help improve calendering, and prevent shrinkage

COURTESY THE B. F. GOODRICH COMPANY

Vinyl coated ice bag that can be cleaned with soap and water broadens field for plastics applications

nary demand which later developments may not justify.

This discussion is concerned largely with the high styrene-butadiene copolymers and their variations rather than styrene copolymerized with other materials. Because of the close relationships, the reader must be cautioned to distinguish between them, for an item such as Plexene or Cerex is a quite different end product from those such as Goodrite Resin 50, Marbon S, the Pliolites, etc., that are styrene copolymerized with butadiene and modified with other chemicals.

Changing the properties

For better adhesive properties, the developer might add vinyl acetate or methyl and ethyl acrylate; acrylonitrile could be added for oil resistance; vinyl chloride or other monomers are sometimes added as modifiers to give certain properties; chlorinated compounds such as paraffin, rubber, and diphenyl give added flame resistance and other properties; raw drying oils such as tung or linseed may be used but are said to have limited compatibility; ester gums (rosin), coumarone indene resins, and all of the ester plasticizers such as tricresyl phosphate and dibutyl and dioctyl phthalate, as well as the sebacates, have possibilities for adding desired properties to the original mix. There are doubtless scores of other materials in use with the styrene-butadiene compound or with styrene alone, but developers are not telling the particular ingredient that gives their material its greatest individuality.

Best known of the basic high styrene-butadiene compounds are those named above. Chief advertised use for all of them except Versalite is as a reinforcing agent for rubber, especially rubber shoe soles, and in paint. For a great many purposes, rubber compounds are heavily loaded. Carbon black in very fine particle size is the most commonly used, chiefly because it gives reinforcement to rubber. But carbon black has a color disadvantage. Shoe soles are frequently desired in other than black. Consequently, one of these high styrene compounds is frequently used (in Neolite, for example) as a synthetic rubber reinforcement.

New rubber floor covering compounds are also on the market using high styrene copolymers as reinforcing agents. They give remarkably high impact and abrasion resistance. Manufacturers assert that with such compounds they will be able to compete with low-cost floor coverings in price, and to offer superior quality, especially since they can produce better color.

Better polish and surface

An informed authority estimates that between 5,000,000 and 10,000,000 lb. of such material was used as a rubber-reinforcing agent last year. It was used in rubber, not only for flooring and the shoe sole market, but also for wire insulation, golf ball covers, steam hose, gaskets, soft ball and basket ball covers, washing machine strainers, and many other items. In almost every case it is used to increase hardness and abrasion resistance; to cut cure time in half; and to give a compound that will calender with a better polish and surface than rubber reinforced with other materials.

In most applications of this type, the rubber compound contains from 10 to 20% high styrene copolymer. Even rubber for boots, shoes, and raincoats

COURTESY UNITED STATES RUBBER CO.

A tote box for textile mills made from a modified styrene-butadiene copolymer sheet stock offers lightness and durability

frequently contains a small amount of high styrene copolymer because it makes processing easier and is said to give better drape and hand. Furthermore, the copolymer resin improves aging characteristics; when used in wire insulation or gaskets for a refrigerator where the end product is expected to serve 20 years or more without replacement, there is less likelihood of deterioration. The purpose, of course, is to use just enough rubber for softness and styrene copolymer for hardness to obtain an ideal material for the job at hand.

Aside from their use as in reinforcing rubber, the copolymers are becoming popular for paint or surface coatings where they are used primarily as thickening agents. Thousands of pounds of such paints have already been used for highway marking and they are receiving increasing attention for use on concrete floors. They are particularly applicable to concrete surfacing because of good adhesion, abrasion resistance, and resistance to alkali. High styrene resins, with unnamed copolymers, are also now well along towards adoption as sizing materials for paper and as supplementary coatings to cut down the amount of linseed oil used for oil cloth.

There is little literature or history to indicate the present status of high styrene-butadiene copolymers as molding, extruding, or laminating materials for use in the plastics industry as such.

Rubber processors watch new materials

The vinyl and thermosetting operators are, at least publicly, more interested in specialty rubber combinations with their vinyls and phenolic than they are in the high styrene-butadiene variations. Insofar as the styrene-butadiene copolymers, as distinguished from other high styrene copolymers, are concerned, most of the producers are in or at least closely associated with the rubber industry. Thus it is natural for rubber processors to be most interested in these new materials which so far have been used largely with rubber to produce products of more than passing interest to the plastics industry.

High styrene-butadiene copolymer resins are in the 35 to 40¢ range and, although thermoplastic, have been successfully molded only by compression methods. The cure time runs in the neighborhood of five minutes at 150° C. with 100 lb. pressure generally sufficient to do the job. These resins are exceptionally easy to handle and release from the mold without difficulty. It would be simple to mold them in an injection press insofar as temperature control, finish, and gate removal are concerned, but the short cycle common to injection molding aggravates the shrinkage problem inherent in these resins. Whether or not they will ever have a large field of opportunity when used as a molding compound without rubber is a moot question.

When these resins are used instead of clay as a loading compound with rubber, the resulting product is just as hard as the clay-filled rubber but has much more resilience. An example is found in molded golf ball covers which are already on the market. They not only lessen the amount of balata needed but give the ball more "click."

There have been no satisfactory commercial extrusions of high styrene-butadiene copolymers, as such, reported, but one producer has announced extruded pipe of a material which reportedly uses styrene-butadiene copolymer as the base material.

As a laminating resin, there is considerable difference of opinion as to whether or not the high styrene-butadiene copolymers have a great future. One producer says "no" but admits that a higher butadiene content than is customary in the other resins might help to solve the problem. Another producer is highly enthusiastic about the possibility of producing a laminating resin for decorative laminates and plywood. A research worker reports that he has a laminating resin of this material which, strangely enough, seems satisfactory for glass cloth but won't work with other fabrics or paper.

Production headaches

There are literally hundreds of other problems involved in obtaining workable products from styrene copolymers. Technicians almost go crazy trying to develop satisfactory formulas. Sometimes the two monomers polymerize at different rates and a third monomer is required to knit them together. When it is decided to polymerize at a different temperature for more efficiency, the technician may find that catalysts and modifiers won't work at that temperature. When these difficulties are remedied, a bad odor may result.

Some producers even look upon all these problems

A styrene-butadiene copolymer used to produce golf ball covers helps to improve "click" and resistance to cutting

Vinyl upholstery in buses takes rough treatment in a field where rubber coated fabric was once supreme

COURTESY UNITED STATES RUBBER CO.

as a virtue because they are indicative of the wide variety of materials that can be obtained and presage the day when a customer in Peoria or Eufala or anywhere else with a service requirement can give his needs, and the research man can tailor-make a material which will meet all of the demands of the projected product.

Proof that a product made from a combination of these rubber chemicals will live up to the dreams of the technicians is claimed by U. S. Rubber Co., with the recent introduction of Versalite. Made in a variety of combinations, depending upon the desired character of the end product, this material is concocted from butadiene-styrene copolymers, GR-S rubber, nitrile rubber, acrylonitrile, polydichlorostyrene, and various other minor agents. The finished product is furnished in sheet form of various thicknesses with a significant statement that it is not yet available as an injection molding powder. In fabricated forms which can be made into irregular and compound shapes as large as 5 by 10 ft., the material is recommended for its high impact strength, resistance to temperatures above boiling, and applicability to deep drawing. Large shipping containers and carrying cases made from Versalite are now in production with a host of items in prospect.

This material is expected to be a forerunner of other high-impact, high heat-resistant styrene copolymer materials that are expected to be announced by various companies in the near future. How far they will impinge upon other materials or broaden the field for plastics and rubber is in the lap of the gods.

Behind all this styrene chemistry is a supply situation of more than passing interest. It is generally agreed that but for the war and the need for rubber, development of styrene monomer production facilities would be nowhere near today's annual capacity, rated by the Government at war's end as 400,000,000 pounds. The Institute, W. Va., plant with a capacity of 50,000,000 lb. has been closed indefinitely, thus leaving 350,000,000 lb. when the reconstructed Monsanto plant in Texas City starts operating. However, it is believed that actual capacity is more nearly 500,000,000 lb., even with the Institute plant out of operation.

The current demand for styrene is estimated at 125,000,000 lb. for rubber at present operating rates of 400,000 long tons; 120,000,000 lb. for polystyrene; and perhaps 20,000,000 lb. for paint and rubber reinforcing compounds, but this last figure is admittedly a guess. Thus, even with the Monsanto plant out of production, there should have been more than

enough styrene at 350,000,000 lb. capacity with a demand for only 265,000,000 pounds. The industry produced over 300,000,000 lb. of styrene monomer in 1947, the excess going into the rubber program before it was curtailed.

The principal question mark in the chemical industry's ability to supply styrene in big quantities is benzol. About 350 gal. are required for one short ton of styrene. The 1947 styrene production required over 42,000,000 gal. of benzol. Total production of benzol was around 165,000,000 gal., exclusive of a few million gallons of motor benzol. An estimated breakdown of the benzol allocation to various end uses made by comparing notes with chemical company technologists is given in the table at the right.

ESTIMATED BENZOL USAGE FOR 1947

	Gallons (in millions)
Styrene	42.0
Phenol (syn)	35.5
Aniline	14.5
Dichlor Benzene	5.0
Monochlor Benezene	5.0
Nitro Benzene	4.0
Nylon	20.0
D.D.T.	4.0
Maleic Anhydride	1.4
Detergents	3.5
Diphenyls	2.0
Miscellaneous	28.1
Total	165.0

Benzol consumption increases

The interesting factor in this background is that nearly all of the products for which benzol is needed are on the increase. And every time the rubber program moves up 100,000 tons, there is a need for almost 9,000,000 more gal. of benzol. In 1945 there were times when the rubber program was consuming benzol at a rate of 105,000,000 gal. annually. That may never happen again as long as natural rubber is available, but it is clearly indicative of the inroads that synthetic rubber can make on such things as polystyrene, synthetic phenol, dyes, etc., all of which require benzol and are necessary to the national economy. It also explains why there was no polystyrene for civilian use during the war — all the styrene monomer was needed for rubber. There was no benzol to make more and still leave enough for phenol, aviation gasoline, and other high priority materials.

Unfortunately, there is slight prospect for more benzol in the near future. The quantity available is dependent upon the coking industry which, in turn, relies largely upon the steel industry for the coal tar derived from the coke manufacturing process. Until the steel industry expands, there will be little more coal tar from which to make benzol than presently produced.

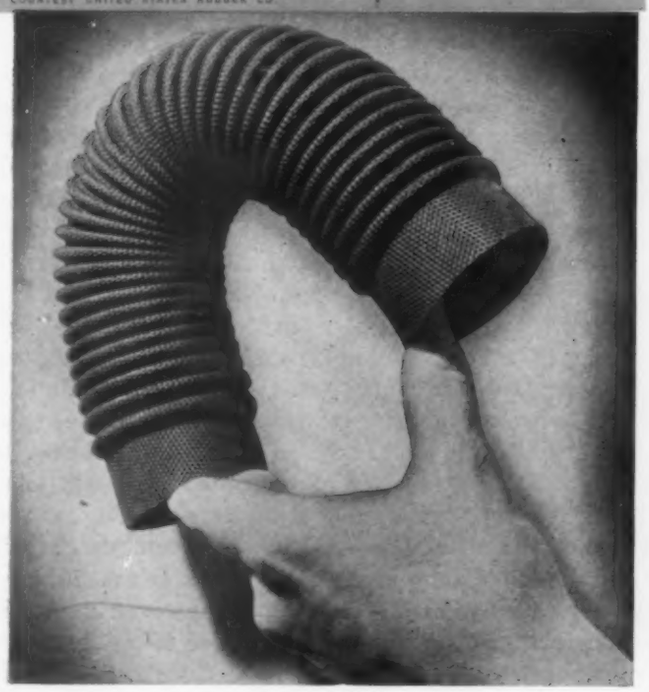
Additional benzol can be obtained from petroleum at a price premium, and thereby hangs a tale. Oil companies are not getting into the benzol business until they are assured a market at higher prices than currently paid. And that market cannot possibly be assured until the future of synthetic rubber is known. Not only rubber, but polystyrene, phenolics, styrene copolymers, and even the polyesters, many of which use a styrene base, are all locked up in the future of GR-S synthetic rubber.

If synthetic rubber tonnage remains under 500,000 tons annually, there may be enough benzol and styrene to permit expansion of polystyrene to 200,000,000 lb. annually (was 95,000,000 lb. in 1947) and a corresponding increase in the other styrenes, plus a phenolic expansion, provided all the styrene and steel plants (coal tar for benzol) operate at capacity. If synthetic rubber goes over 500,000 tons for an extended period, there could be shortages in every other product using benzol as a base. On the other hand, if rubber drops below 200,000 tons, the market for benzol and styrene would probably suffer. No prospective new producer of benzol is likely to take a chance on installing expensive equipment until he knows which way the wind will blow.

As pointed out in last month's "Rubber or Plastics?" article, GR-S rubber is steadily improving

A multi-flex duct utilizes combined properties of plastics, rubber, and glass fabric for high quality installation

COURTESY UNITED STATES RUBBER CO.



COURTESY B. F. GOODRICH CHEMICAL CO. AND O'SULLIVAN RUBBER CORP.

A vinyl innersole binding tape is one of many plastics applications, including soles and uppers, expected to enter shoe field in competition with rubber and leather

and will undoubtedly be good enough for all types of tires some day. But, strangely enough, quality may not be the answer. Many old timers in the rubber industry insist that the future for synthetic as against natural rubber will be determined by price and that natural will win out. They maintain that small production of synthetic will always be provided as a defense measure but that it will never compete pricewise with natural if both are allowed to seek their own level. Furthermore, they maintain that the world economy will be tremendously upset if natural rubber is reduced to a minor crop in the East Indies.

Rubber price fluctuations

The price of natural rubber is never a predictable figure over a long term in a free economy. In 1932 it was selling at 3¢ a lb. though it cost 7.2¢ to produce in the bale on a plantation. A little later, when laborers received 20¢ a day, rubber sold for 12¢, but today laborers are getting $1.00 a day. Before the war, freight was $12 a long ton from Singapore to New York; today it is about $22. The price of natural rubber has fluctuated from 3¢ to over $2.00 a lb. through the years. This wide variation is one reason why synthetic rubber boosters feel that synthetic should be allowed to progress in order to have a more stable price level.

One authority thinks GR-S might drop to 15½¢ if turned back to industry, depending upon the price of petroleum feed stocks; but others say it would go higher under private operation because there would be taxes and other overhead which the general taxpayer now shells out. These same authorities say that natural rubber from efficient plantations could be sold in New York for 12¢ and native rubber at 8¢, the pre-war price, if there were no artificial structure today, and if the necessity for selling at a low price was paramount.

On the other hand, this country has a long tariff history to indicate that politicians sometimes raise Cain with economics. If depression struck and farmers were hard hit, there might be enough pressure to force alcohol from farm products into finished rubber, and a high priced rubber protected by a tariff would follow.

Another interesting angle on the supply problem is that the United States is not necessarily wedded to GR-S as an all-purpose synthetic rubber. The fact that it has to be subsidized indicates that it isn't perfect or industry would take over. It may never become resilient enough with styrene as a comonomer. It is possible that another type of synthetic may yet become a more acceptable general purpose rubber. As an example, there is acrylate rubber which might have been used instead of GR-S if materials had been available. In any case, styrene is not indispensable for synthetic rubber, but there would certainly be a lot of it around if anything serious should happen to curtail GR-S.

Styrene's beclouded future

It is obvious from the foregoing that the future for styrene is clouded with uncertainty. It is here to stay; chemists will never give up such a valuable and utilitarian chemical. Furthermore, the evidence is weighted to indicate that GR-S will also become a permanent resident but in what quantity is anybody's guess, and it is that quantity which is important to plastics.

Today's annual world production capacity for all rubber, exclusive of Russia, is theoretically near 2,000,000 tons of natural and 1,200,000 tons synthetic, according to veteran rubber executives. The consumption is figured at about 1,500,000. United States synthetic production in 1947 was 560,000 tons. It was running at a rate of between 450,000 and 500,000 tons in 1948 before recent legislation was passed requiring that at least 200,000 tons be used. If more ways to use rubber are developed, everybody, including the plastics people, will be happy. The situation will then stabilize. The French are talking about using rubber for pneumatic tires on trains and for cushions between concrete railroad ties and rails. In this country there is talk of rubber slabs for highways and rubber latex mixed with highway concrete to reduce buckling in summer, cracking in winter. One firm now produces rubber insulating panels for housing and conductive panels for radiant heat; producers look ahead to the time when everyone will be sitting on foam rubber seat cushions and sleeping on foam rubber mattresses. Maybe that 3,200,000 tons can be used up. If it can, the world will be saved some headaches, but in the meantime, the plastics industry is going to be teetering back and forth wondering whether there is going to be too much or too little styrene.

BUTYRATE PARTS IN A LAWN MOWER

Plastic protects the working parts of the machine, seals the bearings, provides a comfortable handle grip, and forms a three-piece ground roller which reduces sod scuffing and marring of the lawn

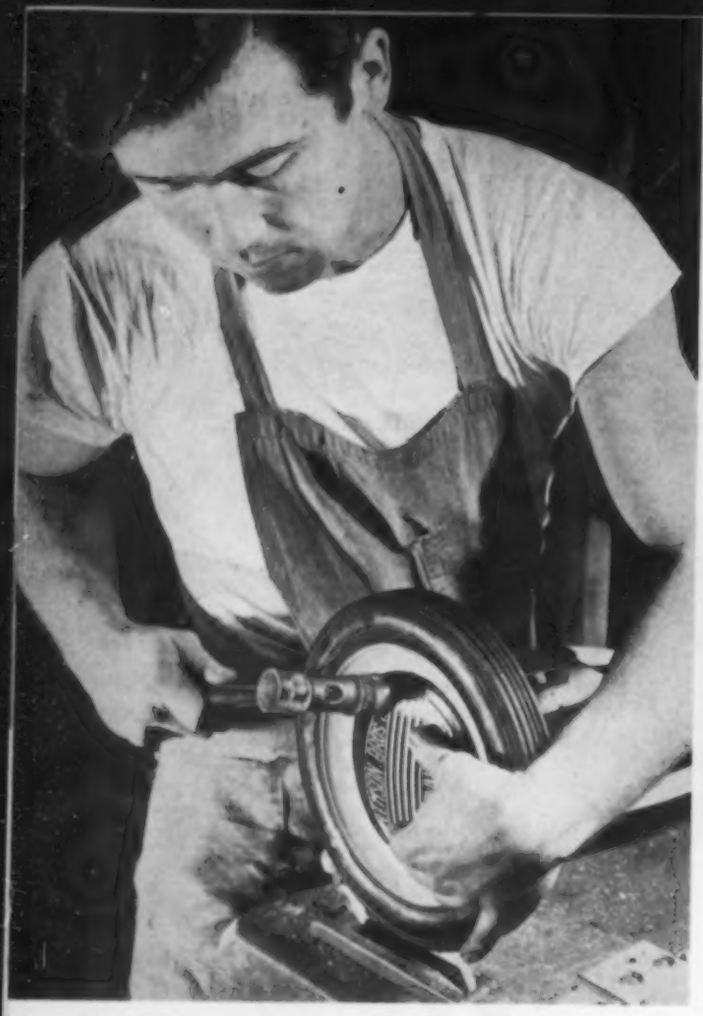
LOOMING large among the sales features of a new light-weight lawn mower is an extensive use of Tenite II cellulose acetate butyrate. Selected for its toughness, impact strength, and all-around ability to take abuse, the Tennessee-Eastman material is used to the extent of 1.3 lb. per unit, or better than 4% of the 29-lb. total weight of each mower. Adoption of the plastic reduced the mower's weight 4 lb., and was instrumental in bringing about a price reduction of 10 percent.

17 plastic pieces used

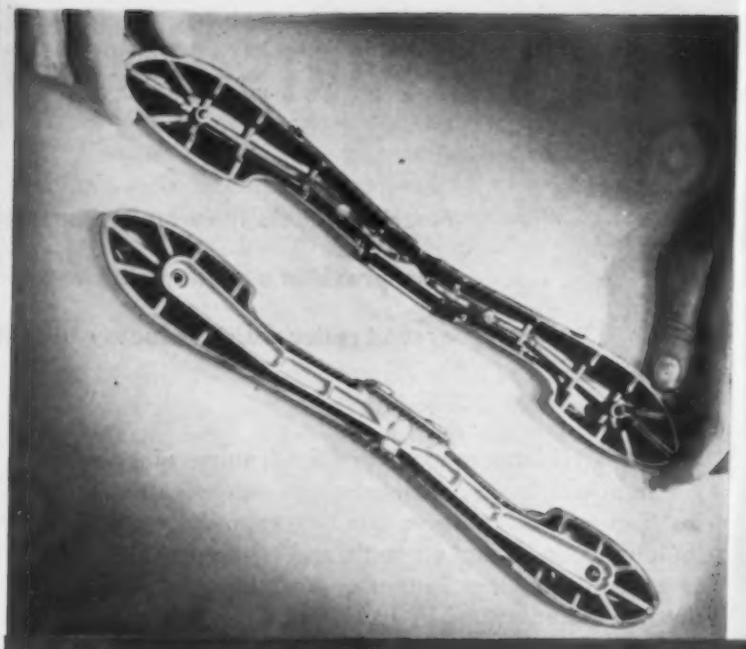
When Clemson Bros., Inc., Middletown, N. Y., sales-minded manufacturer of this new Model E-17 lawn mower, was searching for something different to offer in a highly competitive market, it turned to plastic for a number of the parts. As the photograph on this page shows, five types of plastic components are used, involving 17 separate parts, all of which are molded in the Clemson plant.

Of particular interest is the molding and assembly of the three-section ground roller. Each section consists of two halves, with bearings molded in, plus a

Five different types of parts for this lawn mower are made of cellulose acetate butyrate, totalling 17 separate pieces. Plastic used weighs 1.3 pounds

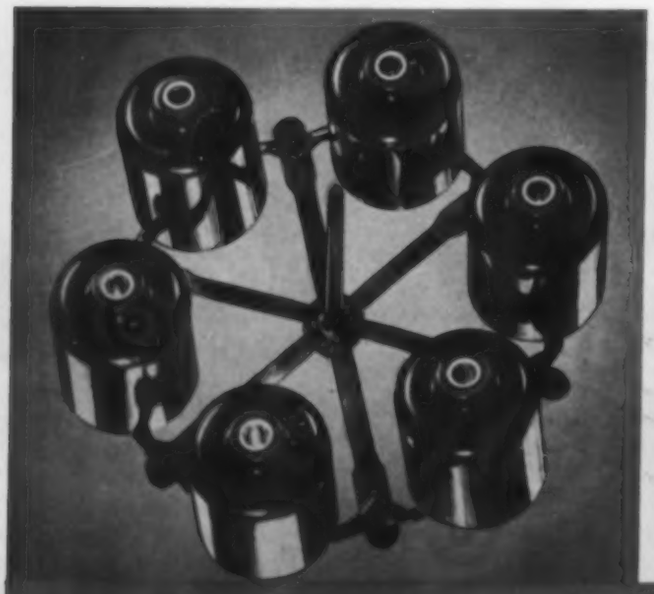


Resilience of the plastic used in the lawn mower parts is such that the hub caps can be sprung into place with a tap of a hammer. In service, they can easily be removed for maintenance and replaced without damage



Halves of the handle grip separated, with die-cast metal insert in position. In production, grip halves are solvent cemented

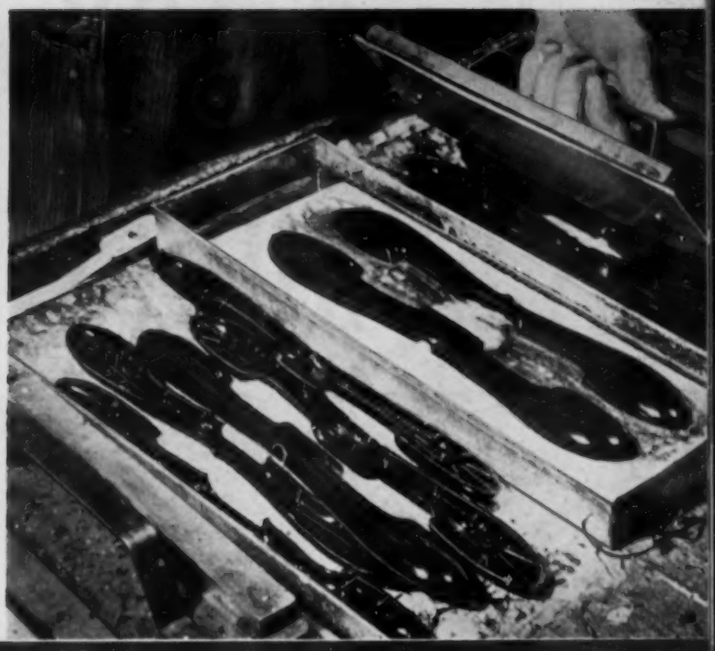
butyrate connecting ring with a center lip. The halves are molded in a six-cavity die and the halves and rings are assembled with a solvent cement. In this operation, the rings are first immersed in the solvent and then each section assembly is put under pressure until set. Experienced gardeners will recognize that since the three roller sections turn individually, there will be little tendency for the roller to mar the turf.



Ground roller half sections are injection molded in a six-cavity die. Note that bearings are molded in place

Injection molding press in which the ground roller sections are produced. Knock-out pins remove the molded parts from the force plugs

Knife trimming the sections of the handle grip. A special jig is used in which a single pass of the knife completes the operation

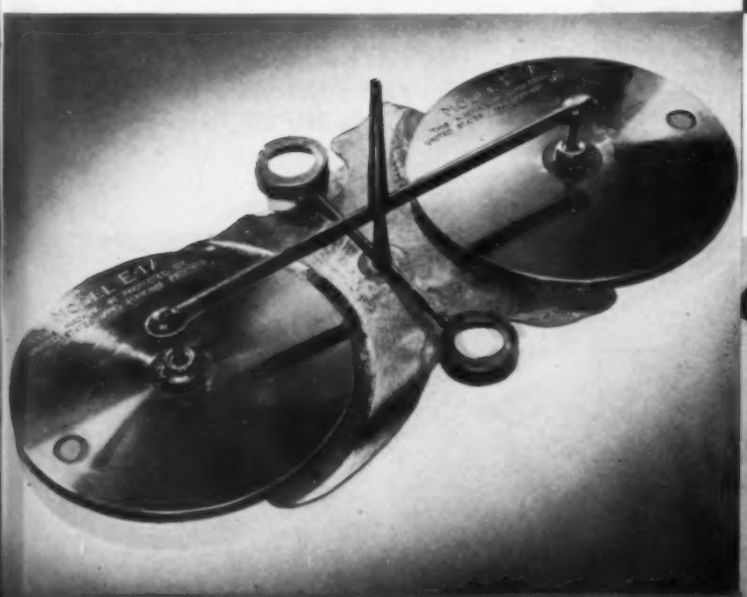


Grip sections are placed on solvent-activated pads, weighted to insure contact, then clamped together under pressure

A similar assembly method is employed with the two-part handle grip, where the plastic sections are cemented around an inner core of die-cast metal.

A tabulation of all the butyrate pieces used in the construction of one of these new lawn mowers shows the following numbers: handle grip, 2; dust covers to keep the mechanism clean, 2; hub caps, 2; reel bearing seals, 2; roller, 6 halves and 3 connecting rings.

Assembling the lawn mower gears which are protected in use by the plastic dust cover, shown in place on shaft



Two butyrate dust covers and two bearing seals, the number required for use in one lawn mower assembly, are molded in a single shot

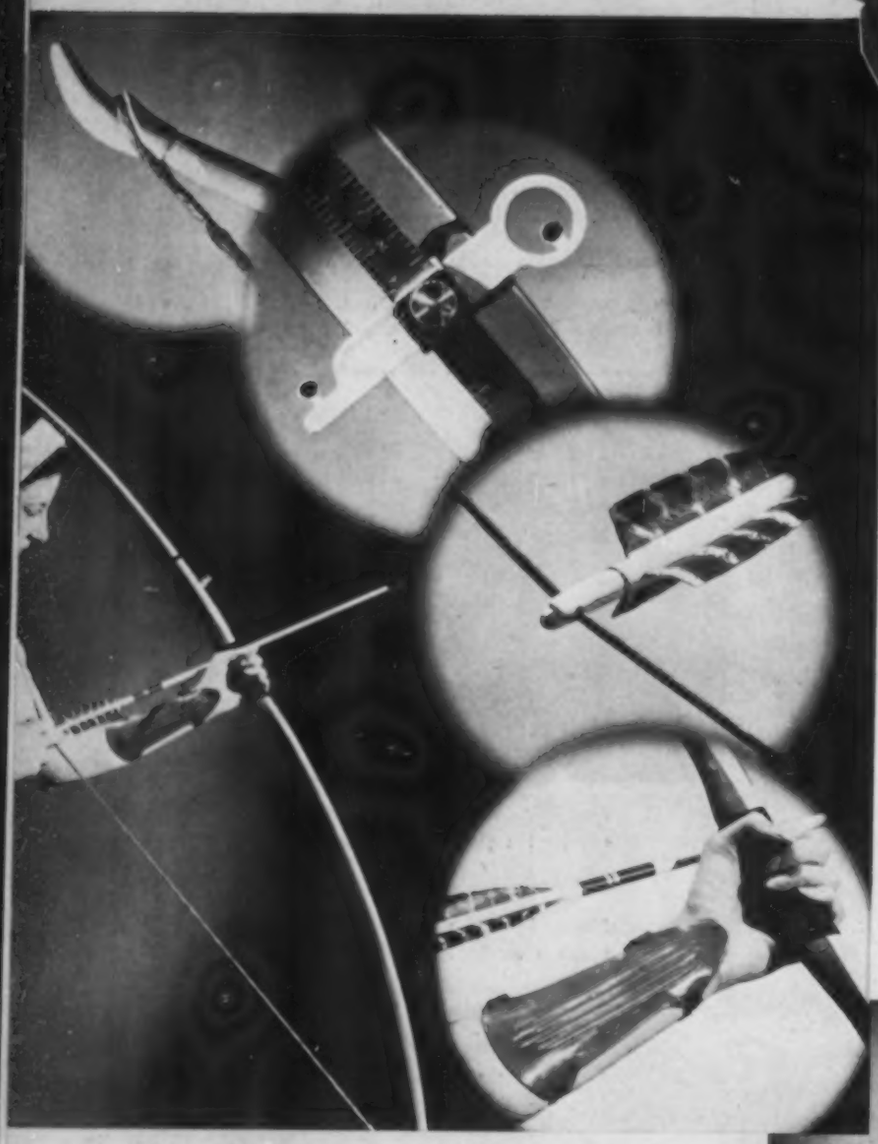
Plastic bearing seals are finger pressed over the ball bearings which are mounted on a removable bearing plate

PHOTOS COURTESY TENNESSEE EASTMAN CORP.

PLASTICS PRODUCTS

Because of its durability and rigidity, Durez phenolic was selected for the housing of the Vibro-Graver which has three attachments to permit engraving on any surface including plastics, steel, glass, embossing paper, ceramics, etc. The unit weighs 9 oz. and is put out by the Handicraft Div., Burgess Battery Co., Lake Zurich, Ill.

The non-corrosive, tasteless, and odorless qualities of polyethylene make it an ideal choice for a vacuum bottle top (below). The cup has the additional advantages of being light, practically unbreakable, and possessing wide color range. It is molded of Bakelite polyethylene for American Thermos Bottle Co., Norwich, Conn.



Plastics, because of their light weight and durability, are used for five pieces of archery equipment manufactured by Fleetwood Archery Co., 4430 E. Eighth Ave., Denver 7, Col. The grooved bow tips, an arrow plate in a matching color inlaid above the leather handle, and arrow nocks are molded of Tenite II cellulose aceteate butyrate. Tenite cellulose acetate is used in the multi-colored deep-ribbed arm guards and the horizontal bar of the bow sight

A colorful wall decoration when not in use, this Lustromat in the shape of a teapot is primarily designed for use as a mat which will protect any surface from hot or cold containers which might cause water spots, sweat rings, or burns. It can be used under hot plates, toasters, coffee pots, casseroles, and the like. Molded of Lustron polystyrene by the Waterbury Companies, Waterbury, Conn., in red, blue, green, yellow, and crystal

Drivers who want to cut fuel wastes and correct bad driving habits can do so with the aid of this new mileage gage manufactured by Snow Plastics Corp., 221 E. 26th St., Chicago, Ill. Housed in an ivory Beetle urea formaldehyde case, the gage measures the amount of gas flowing through the carburetor and registers miles travelled per gal. of gas consumed under any driving condition

Time can be ascertained quickly from a distance with this neat looking, direct reading electric clock compression molded by the Shaw Insulator Co., 158 Coit St., Irvington 11, N. J., for Pennwood Numechron Co., First and Ross Streets, Pittsburgh, Pa. Two materials are used to produce the case in six different colors. Phenolic is employed for black, mahogany, and walnut cases; urea formaldehyde is used for peach, ivory, and blue cases

With this bunny-decorated Vinylite plastic bag, a little miss can carry a purse just like her mother's, yet leave her hands free for such important items as dolls, ice creams cones, and lollypops. The bag can be wiped clean with a damp cloth and will withstand rough usage. Manufactured by Royal Dalton, 517 Washington Ave., St. Louis, Mo., using Bakelite material

Good balance, long wear, and consistent playing qualities of this shuttlecock are due, in part, to the Tenite II cellulose acetate butyrate crown which integrates the head and feathers for accurate flight. It surmounts the cork head, and its angled holes assure correct positioning of feathers. A center pocket holds tiny lead weights. Molded by Duplate Canada Ltd., Oshawa, Ontario, for Thornhill Industries Ltd., Toronto

Keeping shelves clean and attractive is easy with this colorful new shelf paper which is a laminate of Lumarith cellulose acetate transparent film and paper. Manufactured by H. D. Catty Corp., 237 Main St., Norwalk, Conn., the paper can also be used as a lining for boxes or for gift wrapping. The plastic coating assures a permanent glossy finish and a flat surface. The paper can be wiped with a damp cloth without harming the design which is printed on the under surface of the acetate

Stockings in these transparent Tenite II cellulose acetate butyrate containers can be examined by prospective customers without removal, thereby preventing rejects from snags or too much handling. The container can be reused as a traveling case. Made by Extruded Plastics, Inc., New Canaan Ave., Norwalk, Conn., for McGaugh Hosiery Mills, 4408 Second Ave., Dallas 10, Texas

Good merchandising plus protection make Vinylite plastic sheeting ideal for packaging of sporting goods and tools. It can be used as is or with rigid sheet inserts as seen in this ax cover. Besides its sales counter appeal, this sheeting protects articles stored in attics, closets, or basements from moisture and most chemicals. It does not crack or chip, peel or craze, and possesses high tear strength. Fabricated by The J. V. Cox Plastics Co.

PLASTICS PRODUCTS

Digging in the handbag for an extra bobby pin or two is eliminated with this Bobby-Pin Comb Compact which has two built-in compartments along the top for holding pins. To remove pins, either top part is slid outward, away from the center post. Measuring 4½ in. long—a handy purse or pocket size—all the comb parts are molded of Styron polystyrene, using an automatic cam action on the top sleeve, by Cameron Inc., 4611 North Clark St., Chicago 40, Ill.

Frankfurters can be cooked quickly as needed at the table with this electrical cooker molded of Bakelite polystyrene and distributed by the Glendale Provision Co., Detroit, Mich. To use the cooker, frankfurters are pierced by the carbon electrode prongs (top.) When the lid is closed, the circuit is completed and current flows through the frankfurters, cooking them in 1½ to 2 minutes

A new twist has been added to this plastic automatic index by the loose leaf cards which can be easily removed for typing. A smooth sliding selector and spring action push button assure quick service. Molded of Loalin polystyrene by Lewis Plastics, Inc., 230 Fifth Ave., N. Y., the Kwik-List index is available in ivory, ebony, mottled walnut, burgundy, and two-tone combinations. Polystyrene was selected for its economy, dimensional stability, and color range

F. B. STANLEY, Engineering Editor

PLASTICS ENGINEERING*

Several different plastics go into the construction of this new camera, each selected to meet the varying requirements of design and engineering specifications

Engineering Perfects a Plastics Camera

THERE have been many plastic cameras produced during the past years, but in a majority of cases plastics have been used to manufacture a camera which could be sold at a low retail price. Naturally, because of the economics involved in the low-price field, some examples of poor design and plastics misapplications reached the market.

Now comes a plastic camera aimed at the medium price field, in which a thorough-going effort has been made to achieve the optimum in design and plastics application. This new Ansco camera uses several different plastics materials in order that the varying requirements for the different components will be thoroughly met.

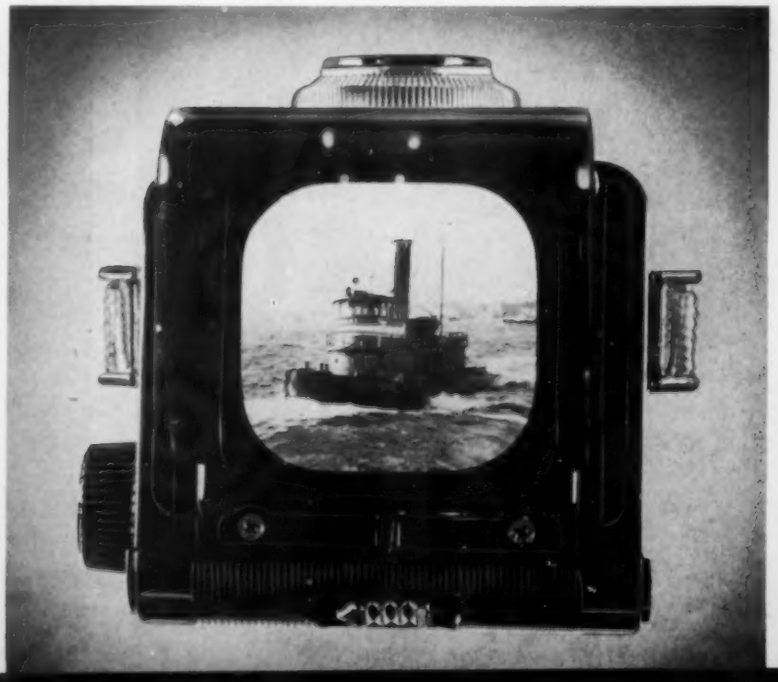
The greater portion of the camera is composed of three polystyrene parts—the main body or carcass, the back cover, and the front panel or lens board. The winding knob for the take-up spool is produced from cellulose acetate and a small press-fit ring, used to secure the front finder lens in a zinc die casting, is molded of cellulose acetate butyrate. A

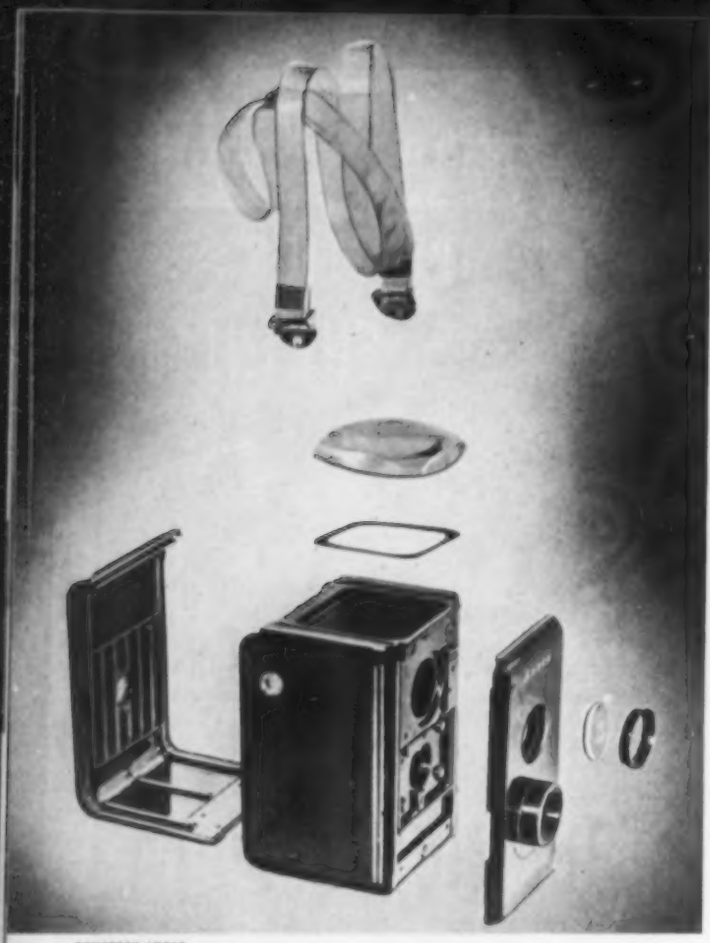
*Reg. U. S. Patent Office.

Back and side of new Ansco camera, showing vinyl carrying strap and the ribs milled into polystyrene case

Looking down into top finder lens. Cellulose acetate winding knob is at left. Front finder lens is held by a cellulose acetate butyrate ring

PHOTOS ON THIS PAGE COURTESY ANSCO





COURTESY ANSCO

Explosion view of camera shows various plastics and other components in relationship to each other

translucent carrying strap is produced from extruded vinyl and a small shutter lever release button, a distinguishing feature on all Ansco cameras, is machined from extruded cellulose acetate rod. The red index window in the rear of the camera is die cut from cellulose acetate sheet stock.

All of these materials were specified for definite reasons. In the case of the carcass, back cover, and lens board, polystyrene was chosen for its dimensional stability and high heat distortion point. As a matter of fact, Dow Chemical Co. developed a special high heat resistant formulation especially for this application. Equally important in the choice of this material was the exacting requirement in camera manufacture that any material used near the film must be so formulated that it will have no fogging action on a photographic emulsion. Each batch of polystyrene is tested by Dow in collaboration with Ansco chemical engineers to assure that the plastic is photochemically inert and opaque to light.

Cellulose acetate was chosen for the winding knob because of its excellent moldability around a metal insert which is specified for this part. Because the knob is mounted on the camera exterior, it was not necessary to investigate the chemical reaction of this material with reference to the film.

The compatibility of the vinyl carrying strap with the polystyrene housing was carefully checked. Ansco engineers state that there is no danger of deterioration of any of the materials due to their close relationship with each other.

Another interesting sidelight in the development of this camera was the matter of obtaining a suitable decalcomania with an adhesive which would be satisfactory for bonding to the polystyrene carcass. This special adhesive was finally developed by the Durochrome Co., Inc., which makes a specialty of furnishing decals for application to polystyrene.

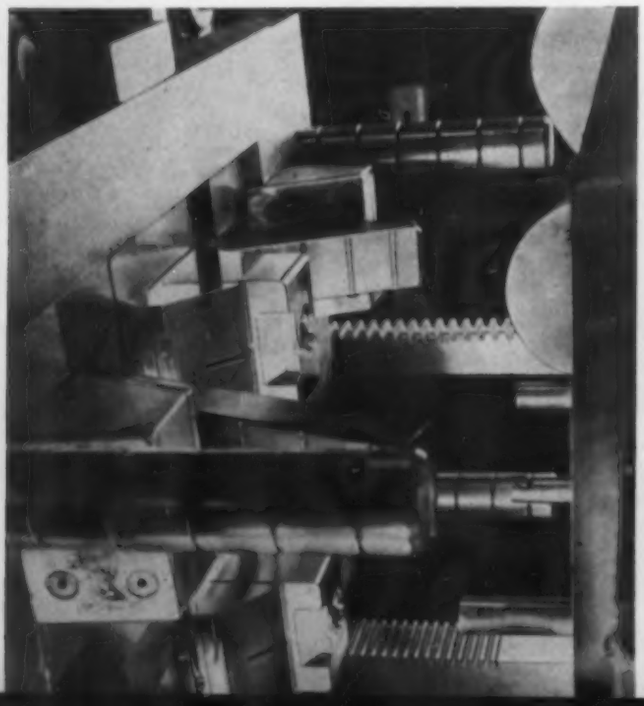
Design responsibility

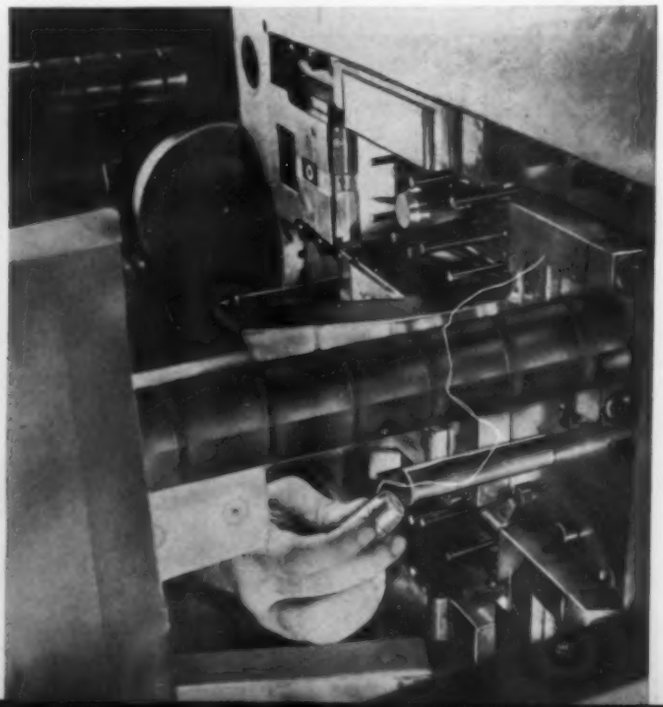
Throughout the entire engineering and development of this camera, the office of Henry Dreyfuss collaborated on the design and was responsible for the general appearance of the camera. It was de-

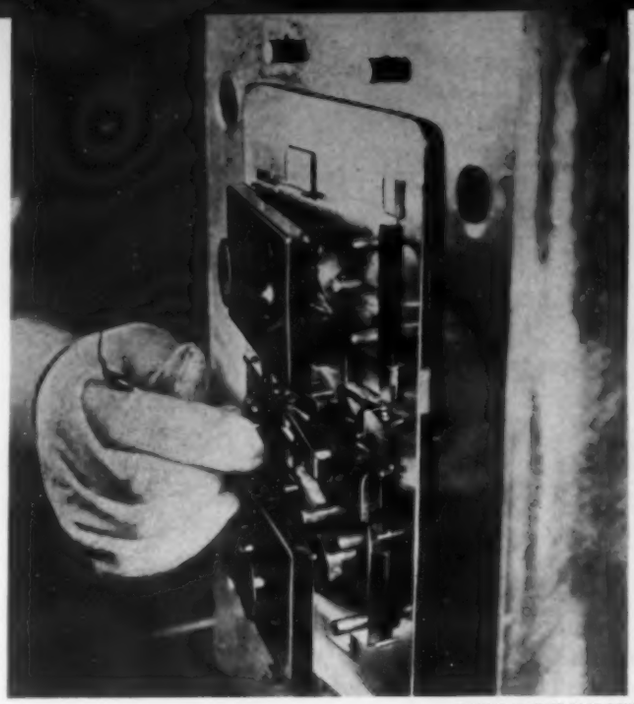
Movable half of the two-cavity carcass mold shows intricate cam action necessitated by complicated undercuts

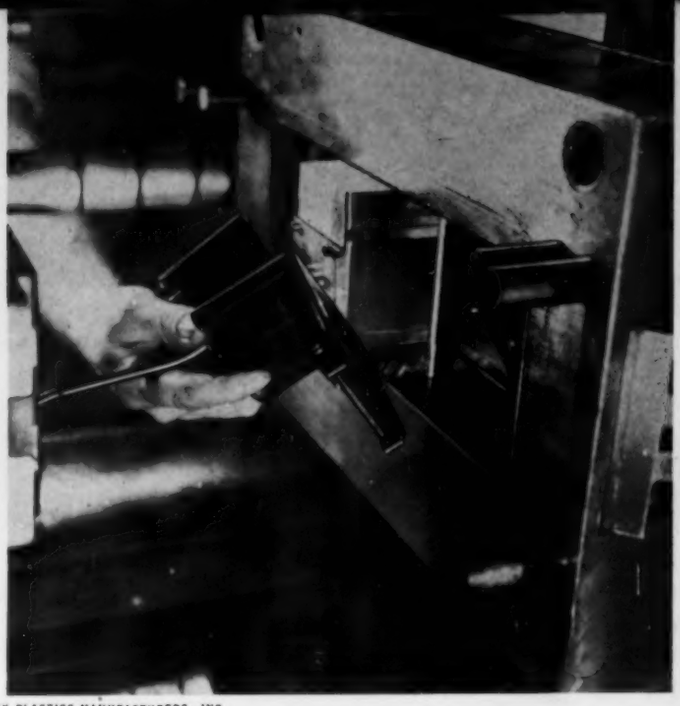
Threaded hole in carcass is molded in by using removable threaded plugs. Operator is shown placing plug in mold

COURTESY PLASTIC MANUFACTURERS, INC.









PHOTOS ON THIS PAGE COURTESY PLASTICS MANUFACTURERS, INC.

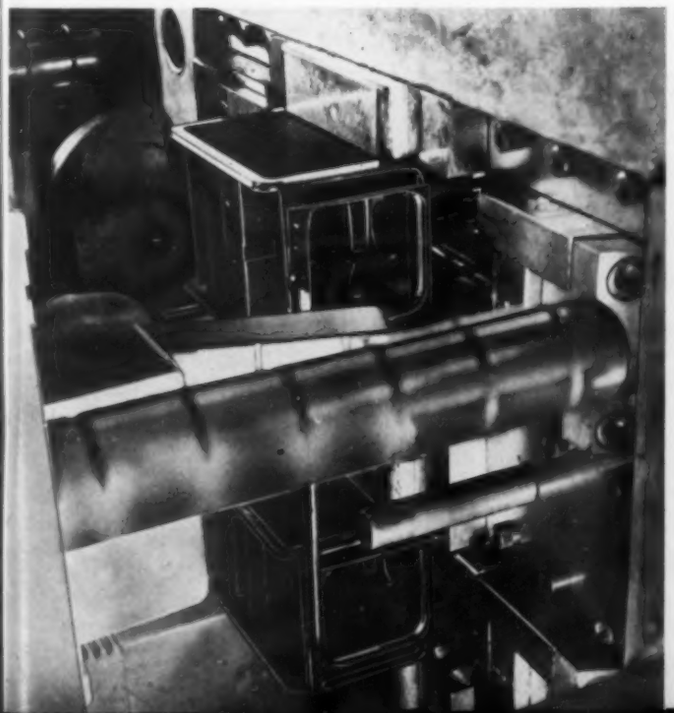
Removing complete shot of lens board and plugs for recesses in the carcass from four-cavity combination mold

Back cover of the camera is produced in a two-cavity mold. Pieces are removed from the mold by hand, as shown above

cided that if the wide flat areas of the sides and back were made smooth, they would be shiny and prone to show finger marks. This type of surface is also difficult to mold without showing flow lines. For these reasons the design called for milled "V" lines, 3/64 in. on centers over the entire surface.

Although a great deal of engineering was necessary before the final design and over-all specifications were frozen, this part of the job was only the beginning. Many of the parts required molds which were intricate in some cases and, in other cases, called for very accurate and painstaking machine tool work.

As mold for carcass opens, cam actions retract metal parts which form undercuts. Parts are removed by hand



The main body or carcass, back cover, and front panel or lens board, are each molded in two-cavity injection molds by Plastic Manufacturers, Inc. Of these three units, the carcass presented the greatest problem from a mold design standpoint and because of the difficulties encountered in molding. When the molds were first constructed, the specifications called for comparatively thick walls at the ribbed sides of the carcass. Engineers of Plastics Manufacturers recommended that the mold be so designed as to thin out these parts and make the walls as uniform in thickness as possible. This was done by molding two holes in the top of the carcass. The molder was able to incorporate two cavities for molding plugs in the two-cavity lens board mold, thereby making a four-cavity combination mold. One of the finishing operations now requires that the molded plugs be permanently cemented in the recesses or holes. In this way a pleasing exterior appearance is produced and the molding of the carcass becomes much less complicated than it would have been otherwise.

Threads molded in

Another feature of this camera required that a thread be molded in one of the apertures of the carcass. This thread was needed so that the rear objective lens could be adjusted for focus at the factory. After exact focusing, the objective lens assembly is permanently sealed in place with shellac.

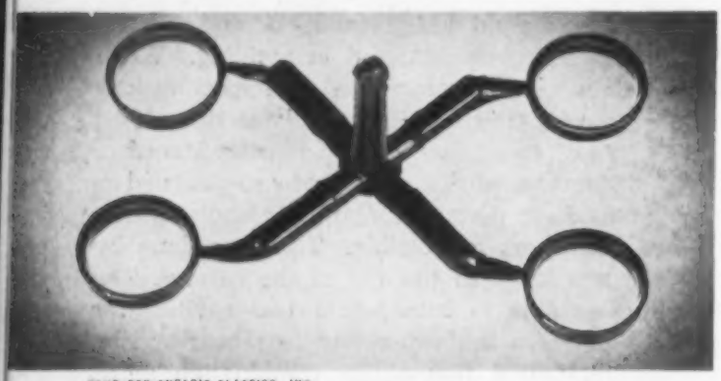
The mold for the carcass was already complicated by the many undercuts which required mechanically operated mold parts. Of course, it would have been possible to unscrew automatically the mold parts which produced this thread but the mold designer decided that threaded plugs which could be removed

from the mold when the shot was taken out, and then unscrewed from the molded parts, was the simplest way of tackling this problem. Two sets of threaded plugs are used so that the molding cycle is in no way slowed down.

The molding of the back cover and lens board can be called standard production jobs and, although they require careful attention, they do not present any difficult problems, except that of exact uniformity of contour. It is essential that all parts fit each other perfectly in order to assure light tightness.

It was not practical to mold all the various holes in the carcass and back cover, although it would have been possible to mold many of them. It was decided, however, in the interest of accuracy, that it would be more feasible to set up for jig drilling these holes with equipment shown in accompanying photographs. Since the accuracy of the location of the holes is completely dependent upon the drilling jigs, the vertical motion of the spindles is automatically actuated and controlled. Inasmuch as speed of feed is probably the most important factor in drilled hole diameter accuracy, the reasons for choosing automatic drilling equipment immediately becomes apparent.

The photo at the upper right on page 111 shows an interesting milling and drilling setup as far as efficiency of operation is concerned. In this setup, one operator not only mills the gate from the carcass but also drills a small hole in the same piece. In the right foreground can be seen an air cylinder which actuates the traverse of a milling cutter. The operator merely clamps the polystyrene carcass into the jig, presses a button, and the milling cutter traverses through its motion automatically. When she has started the milling operation, she places a piece that has just been milled in the jig at the left. Having clamped this into position, she presses another button which causes the drill press to operate automatically. Vertical motion on this machine is also actuated by an air cylinder.



COURTESY ONTARIO PLASTICS, INC.

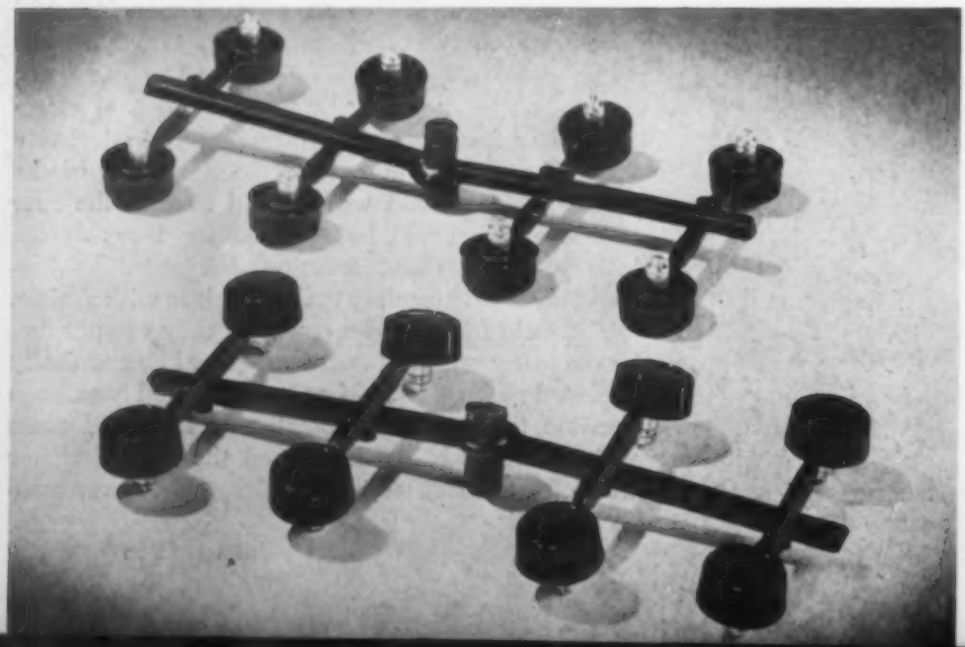
Cellulose acetate butyrate retaining ring for front finder lens is injection molded in four-cavity mold

Preheated inserts

Monaplastics, Inc. is producing the winding knob for the take-up spool in an eight-cavity injection mold. This knob is designed with a metal insert. In working out the problems connected with this job, the molder has added a bit to the technique of injection molding parts with metal inserts. He preheats the inserts before loading them into the mold. With cold inserts there would be the possibility of shrink marks becoming apparent. By heating the cavity of the mold to 165° F., and the force plugs to approximately 85° F., and at the same time using hot inserts, he was able to hold the close tolerances required. The molder also uses castor oil as a lubricant on the force plugs in order to eliminate sticking. The mold cycle is 1 min. and the parts are immediately chilled in cold water for 5 min. before degating. Every knob is checked with "go" and "no-go" gages in order to be sure that the knobs are dimensionally accurate.

One other molded plastic part used in this camera is a lens retaining ring which is being produced by Ontario Plastics Inc. in a four-cavity injection mold. Because of the thin wall section and shape of this part, the molder did not believe that polystyrene would be tough enough for the application. He

COURTESY MONAPLASTICS, INC.



Winding knob for the camera's take-up spool is of cellulose acetate with special insert molded in. These parts are produced in an eight-cavity mold

PHOTOS ON THIS PAGE COURTESY PLASTICS MANUFACTURERS, INC.

As soon as carcass parts are removed from the mold, first finishing operation is performed; the gate is removed by a band saw

Dual finishing setup for carcass pieces. At right, gates are finish-milled; left, a hole is automatically drilled

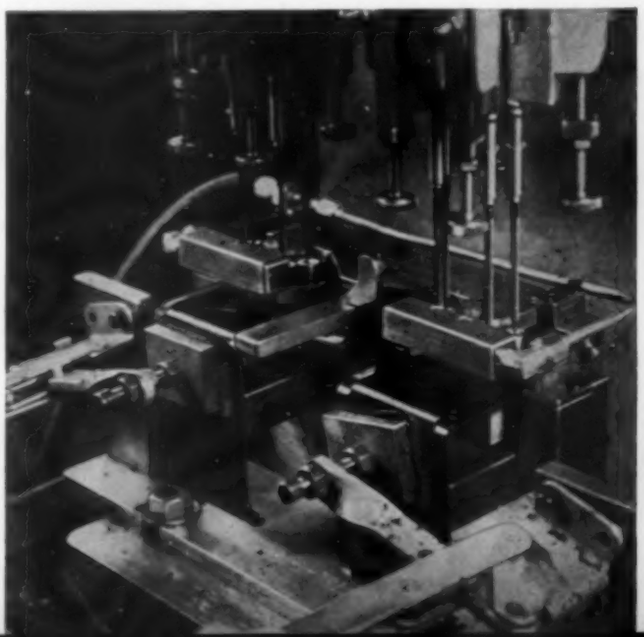
also felt that cellulose acetate would not be quite good enough from a dimensional standpoint and for this reason he is producing this ring from cellulose acetate butyrate. In order to further assure accuracy of dimension, the mold was designed with a stripper plate. This enabled the operator to remove the parts from the cavities with the least possible chance of causing distortion.

There are, of course, many additional components required to complete this camera. The remaining plastics parts which have not been discussed include the extruded vinyl carrying strap, the die cut cellulose acetate index window, and the small shutter lever release button, which is turned out on an automatic screw machine from extruded cellulose acetate.

Drive screws, rivets, and hinges are important parts in the assembly operation, although heat sealing is used for certain parts.

There is little doubt but that this camera is a practical piece of equipment from a photographic standpoint. It has been properly designed, proper materials have been specified for the various parts, and all the plastic molding operations are now going forward in a satisfactory manner.

One operator can turn out thousands of carcasses a day with this multiple drilling machine and special jig

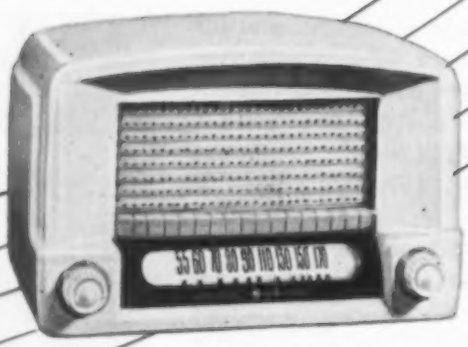


Both pieces of equipment in this dual multi-spindle drilling set-up are handled by one operator. Quick-acting clamps hold camera parts in drilling position

Why
a Plaskon Molding Compound
is used for these new
radio cabinets

GENERAL ELECTRIC

with help of



HOLLACE SHAW, lovely concert star, heard regularly on the "Saturday Night Serenade" over C.B.S.

creates strong buyer preference of PLASKON MOLDED COLOR

APPEALING COLOR

Thermosetting Plaskon Molded Color tones lend rich sales appeal that results in buyer preference. This lustrous color is permanent, non-fading . . . *solid color* through and through.

ATTRACTIVE DESIGN

Thermosetting Plaskon Molding Compounds can be molded into any practical shape and design, to achieve unusual and distinctive product identity. Molded Plaskon retains its shape permanently—will not sag or warp under influence of heat.

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Once the original mold is established, thermosetting Plaskon compounds can be molded in large quantities at low cost, each finished article true and exact to specification. No polishing is required . . . no costly finishing operations.

Write for free illustrated Plaskon Molded Color book. Services of our expert technical men are available to you.*

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In Canada: Canadian Industries Limited, Montreal, P. Q.

PLASKON

TRADE MARK REGISTERED

MOLDED COLOR

COURTESY ZENITH RADIO CORP.

Rigid vinyl sleeves are molded in press in center, cooled in second press at right. Open molds are visible at left

Induction Heated Molds

by HERBERT CHASE

IN the new Zenith "75" hearing aid, the two-conductor cord which runs from the unit to the ear piece is very flexible and is coated with vinyl insulation which, of course, is also very flexible. At the end which fits into the ear piece, it is necessary to apply, at a Y-joint, a harder and less flexible vinyl covering next to the extreme ends of the conductors, which are left bare to receive tiny metal terminals. This covering is applied in the form of short sleeves of vinyl tubing which are slipped over the wires.

After the sleeves are in place, they are softened and molded in the setup illustrated. This operation is performed in eight-cavity molds, several of which are shown open on the bench at the left in the illustration. The sleeves are applied and the wire ends are stripped and cleaned before the cords are delivered to the bench where the molding is done. Here the ends of the cords are set into the mold cavities and the sleeves are adjusted so that precisely controlled lengths of the wire ends will be covered by the mold and will remain free of the plastic. The cords extend from the mold through slots so that only a short length is heated, close to the sleeves to be molded on.

Molding is done in an air-operated press and the details of the molding process up to this point are ingenious but cannot be called new or startling. However, the method of heating the mold is so different from that usually used that it should be of interest to every fabricator and molder.

The plastics industry has made use of high frequency heating in many different ways but each setup has been designed for that class of electronic work known as dielectric heating. In this new Zenith setup, however, induction heating is used. As can be seen in the photograph, an open coil, made up of a few turns of heavy gage wire, has been incorporated into a special type of mold fixture. When a high frequency current is passed through this coil, an alternating magnetic field is set up in the space surrounded by the coil. When the metallic mold is placed in position and clamped by the air cylinder, it is directly in the field. When power from the high frequency oscillator is passed through the coil, the mold itself is quickly heated. The hot mold, in turn, softens the relatively rigid vinyl sleeves so that they bond to the flexible vinyl insulation.

As soon as the plastic is hot enough to flow as required, which occurs at the end of a predetermined time, the current is shut off, the press is opened, and the mold is shifted to a second air-operated press (right in illustration) where the mold remains until cool enough for the moldings to retain their shape.

Production rate is rapid

Since molds are charged by one operator and put through the molding cycle by a second operator, and eight cords are processed in each mold, the rate of production is quite rapid. Because the heating is automatically controlled, uniform results are secured. A red pilot light on the bench goes on at the start of the heating cycle and a white one when the heating is completed, as a signal to open the press. Although the setup is unconventional, its novel features make it unusually efficient for the type of work involved.

The principle of induction heating of a mold which is involved in this setup should find many applications for the processing of plastic materials. When molding or forming thermoplastics by compression, and when an unusually long cycle is involved because the mass of steel in the mold must be alternately heated and then cooled, a comparison of the time required for heating versus that of chilling will show that the greater portion of the time is required for heating. By using an induction heating setup, such as the one described, the heating portion of the total cycle can be greatly reduced. Of course, engineering ingenuity will be required for each individual setup. However, the advantages to be gained by such a method should go a long way toward proving this type of operation.

Mold Techniques for Polyester Casting

by WENTWORTH WEEKS

Inexpensive cavities may be prepared in quantity from available materials, but the nature of these materials and the peculiar problems related to polyester casting demand new techniques and mold constructions. In effect, the caster of polyesters must turn mold maker if he is to achieve economic production.

TWO major factors have held up progress in polyester casting. That these resins change with appropriate catalyses from liquids of varying viscosity to solid form, without need of presses or elaborate mechanical equipment, was dramatic enough, and the physical and chemical characteristics of the castings—transparent or opaque, flexible or rigid—opened vistas beyond the scope of most traditional plastics. The casting procedure, with its implication of freedom from the limitations of molding and fabricating, added enticement. But these glowing prospects have been, until fairly recently, overshadowed by two severe handicaps—the curing cycle, with its required exact control of heat and catalyst, and the lack of adequate mold materials.

The first handicap has all but vanished under the combined assault of resin and catalyst manufacturers. It is entirely feasible to cast polyesters at room temperature with, at worst, a brief post-cure in the oven, and even that may be eliminated in many instances. There is even reason to believe that some castings cured at room temperature have superior qualities to castings cured on the older slow schedules. Dealing with minutes rather than hours, these newer cures step polyesters out of the freak class and into line as production materials.

The second handicap has been side-stepped too frequently with vague generalities. It is easy enough to say that a resin may be cast in almost anything but such a statement is none too informative. Almost anything *can* be used, with or without various treatments and qualifications. But a potential manufacturer needs information on specific, usable materials that can be adapted to the type of item he wishes to produce. Since the casting cycle, however expedited, is still too slow for dependence upon single cavities, multiple molds are a must. And multiple molds must be low in unit cost or the advantage of casting over other production is immediately minimized. Fortunately there are materials available in both rigid and flexible form which meet these requirements of cost and adaptability. Unfortunately the said potential manufacturer must learn to handle these materials himself, in his own plant as part and parcel of his operation.

This last is an economic necessity in multiple mold operation, even if a source is found for some specialized work. But it need not loom as too formidable an obstacle. The cost of any equipment required can be written off on the first quantity run, and the asset of self-sufficient and controlled operation remains. Replacements are then easily available. Changes of design or a switch in runs present no problems. The two procedures, mold making and casting, overlap and interlock for a sound, thoroughly integrated operational set-up.

While polished metal or glass give best mold surfaces and easiest release, the limitations in cost and adaptability are obvious. The same applies to glazed ceramics. Tooling or hobbing is out of the question when 50 or 500 cavities are needed, although cast glass molds have been used and sheet glass or metal has been assembled into simple forms. Sheet acetate pinch-hits for purely temporary work at low temperature. Some rod stock is now being poured in glass tubes, which is broken to free the castings. Lead molds, made by dipping mandrels into molten metal, have been inherited intact from phenolic casting. Low-melting alloys show promise when similarly handled or they may be cast in plaster to give relatively inexpensive cavities. Where draw permits, multiple molds may be stamped of sheet aluminum or brass. Electroforming comes within reason for some applications, since the deposit can be kept extremely thin. None of these is completely free from shortcomings—and the resin used must be considered; some metals inhibit cure.

Sculptured head of conductor Pierre Monteux is cast in solid two-piece mold. Note flexible core to reduce mass

ORIGINAL BY ROBERT COOK, SCULPTOR

ALL PHOTOS COURTESY MULTI-MOLD PRODUCTS

Temporary molds are made of hot-melt plasticized gelatin composition. They can be used for one or two castings only

Two-piece solid mold was made from glass dish (left). Note sharpness of faceting reproduced in polyester casting (right)

Sprayed metal molds seem most practical from the dual standpoint of economy and utility. Their production requires multiple masters of plaster or cast stone, since respraying is not always feasible, but the cost per cavity can be held down to two or three dollars or considerably less if a gun is installed by the caster to make his own molds.

Within limitations of heat-resistance, low-melting alloys give proportionately better surfaces. One in particular (1)[1], recently introduced, seems ideally suited to polyester work with a melting point just above maximum cure requirements. Sprayed zinc—or similar base metals—are less expensive and almost as easily utilized. Extremely thin layers of another metal, such as tin, improve cavity surfaces and wear. Unfortunately this type of spraying is new and experienced operators are hard to find.

[1]Numbers in parentheses refer to "Material Sources" tabulation on page 118.

Sprayed molds must be thoroughly sealed before use. However sleek the cavity appears, it remains porous and the pores must be closed before the resin reaches them. Some beautiful bonds have been effected between such molds and resin cast uncautiously therein. Mold sealing can be done in three ways. Hot melts—standing up to cure temperatures—can be used to saturate heated molds completely. Several high-melting waxes and moderately resistant plastics are suitable. (2,3) Certain other plastics, including some of the polyesters themselves, may be polymerized in situ after thorough cold impregnation to give an excellent finish and seal. (3,4) Some coatings adapted to spray, brush, or dip application—air-drying or baked on—stand up very well under continued usage. (3,5) No thermoplastics, such as shellac, varnishes, or lacquers, can be considered dependable since they are vulnerable to the solvent action of the liquid resins even though they withstand low heat. Any coating—as opposed to sealants and impregnations—should be applied inside and outside to give complete seal and avoid lifting.

The heat conduction of metal is a great advantage in dissipating exotherm of curing resins, especially in closed cavities of any size. Plaster, on the other hand, is far too good an insulator; heat is trapped and built up, sometimes with disastrous results. However, for many purposes, plaster and similar hydrates such as cement and cast stone can be used for temporary molds. Plaster eventually breaks down with continued heatings.

Cast stone, or hydrates upon a silicate base, give the best surface and heat resistance but their density resists impregnation. Incorporation of metal powders or the use of combination systems where hydrates and metal compounds solidify as a unit seem the most promising compromises between the advantages of metal and those of hydrates.

Surface treatments

All such materials must also be sealed for casting release and, when possible, deeper impregnation is the best insurance of maximum life. Depending always upon heat requirements, a number of water-soluble films which strongly resist hydrocarbon resins may be used as surface coatings. Even glue performs successfully in some cases. Agar-agar, algin, or alginates (9), methyl cellulose (6), carboxymethyl cellulose (8), and polyvinyl alcohol (7) may be painted on in water solution. These should be plasticized to prevent cracking and can profit from the addition of wetting agents (10). Some such coatings come prepared ready for use by the mold maker (3).

Deeper impregnation can be obtained with low-viscosity, thermosetting plastics, and in some cases these can be mixed directly with the hydrate in making the mold (11,12,13). Others are applied by dip or successive spray coats built up without in-

termediate drying to obtain maximum penetration (3,14,15,16). These are available in both air-drying and heat-cured forms. The relatively mat finish left by some impregnations can be buffed to a high gloss with a suitably temperature-resistant wax. In all cases the reactions of the particular resin to be cast should be checked against the impregnating material, since cross-reactions may occur. Well-cured phenolics and ureas are usually safe and sure. Silicones are almost ideal, except for cost.

Some of the polyesters themselves have been used—with or without filler—to cast molds in which, in turn, their close relatives are cast. Cured resin is frequently non-reactive toward the uncured, and can be selected to withstand the temperatures required. Cast phenolic also performs satisfactorily. Some of the hot-melting casting plastics, such as ethyl cellulose, are occasionally suitable. High-temperature, hydrocarbon-resistant waxes—when plasticized to reduce shrinkage—make molds with good surfaces and self-releasing qualities. Both of these last require special formulation by the caster, since they are not available in prepared form. Both, again, must be chosen with the resin and temperature requirements in mind and adequately tested before use.

The chief disadvantage of any rigid mold material is its rigidity. While shrinkage in polyesters has been cut drastically, it remains a factor. Mold design, using over-size sprues or built-in reservoirs to feed down extra resin during gelation, keeps dimensions under reasonable control for closed molds, and open molds can easily be poured a calculated distance above the desired level. But where details or fins jut into the cavity or where a central core rises in the mold, such projections can be gripped by polymerizing resin with sufficient force to tear them out bodily. Or, just as bad, the resin cracks upon them. The problem may be side-stepped by removing castings while still flexible—though tender—before shrinkage is complete. The more direct solution is to use flexible molds or mold sections.

Possibilities for a good flexible material have long been evident. The implied latitude in design, with unlimited undercuts and three-dimensional detail, is tantalizing, as is also the ease of release, by pulling the mold away from the casting in lieu of a straight draw. The trouble was finding the right flexible material.

Rubber molds are much used in phenolic casting, and, in isolated cases, with polyesters. The latter, however, are more active that the phenolics, and their catalysts are more damaging. While rubber latex itself is comparatively inert, various additives used in curing and vulcanizing often affect resins, and vice-versa. Some rubber molds are made by compression of pastes, but the usual type is built by successive spraying of latex in thin layers, with drying intervals in between—a somewhat time-consuming process hedged around with numerous "secret cures" beloved of the craftsman. These thin though strong constructions pull away from supporting backings under the suction of the shrinking resin, causing unexpected distortions. Dimensional stability and aging are additional problems.

The alternative conventional flexible mold material is the hot-melt vinyl chloride based on Koroseal or Korogel (17), requiring protective coatings, frequently renewed, for many resins. One new formulation, based upon a Thiokol rubber, cures at room temperature but it, too, presents problems where more active resins are concerned (17,18). For work at lower temperatures, gelatin and glue molds serve but have limited life. Other water-base gels, usable in theory but requiring considerable development, hint at waste mold applications.

Most satisfactory formulation

Of all the available elastomeric materials, polyvinyl chloride formulations of the non-reusable, heat-cured plastisol type—not to be confused with the hot-melt type referred to above—seem most satisfactory. But even these are not perfect. The liquid resins act as solvents on plasticizers within the vinyl, causing surface hardening and susceptibility to damage. This is emphasized when the resin

Novelty animals are cast in various types of molds. All except the elephant are cast in one-piece molds. No supports are needed for small objects of this sort, especially when the mold used is the solid block type, slit for release and closed with gummed paper tape

dwells overlong in the mold or when exotherm rises too high. On such occasions the resin appears to polymerize with the plasticizer in the mold walls, even tearing out chunks in extreme cases. With reasonable precautions these materials are entirely practical for production.

Mold life may be prolonged by proper choice of separating agents, control of exotherm, and removal of casting in gel. Specialized forms compounded with polyester applications in mind are prepared by several firms (3,17,19) and under optimum conditions will deliver upwards of 100 impressions per cavity.

Ease of mold replacement

While this figure is low, the ease with which replacements may be made is compensatory. These plastisols are dispersions of vinyl chloride (with vinyl acetate or the copolymer) in a plasticizer. Since such materials are soluble only with difficulty at room temperature, they are stable indefinitely, pour with ease, and quickly turn to rubber-like compounds on heating. The cure, taking from 15 to 20 min. at about 350° F., fuses plasticizer and resin into a flexible form. One variety (3) cures at the lower temperature of only 275° F., or over longer periods in boiling water.

The plastisols are remarkably adaptable to mold making purposes since they may be poured cold over cold copy, giving trapped air ample time to escape, or may be set up almost at once by applying to heated surfaces. Fidelity of detail is such that brush-strokes, finger-prints, and even the thickness of printer's ink have been picked up in a mold and reproduced in a resin casting.

Viscosity varies with formula adjustment, and paste types of sufficient stiffness will "stay put" even upon vertical surfaces when applied by spatula, without sacrificing detail. Altering plasticizers or resin or both gives the varying degrees of flexibility and rigidity suitable for various scale molds in both pourable or spatula applied types. Not all plastisols, however, are usable with polyester resins and only those specifically formulated for such applications should be used without adequate preliminary tests.

One other flexible material worthy of note is a very expensive composition based upon silicone rubber (3) and requiring careful handling plus long cure. To the writer's knowledge, this represents the only permanent flexible material suitable for casting acrylics and similarly active monomers. Resultant molds are tender and easily torn but chemical resistance is superb and temperatures of as high as 450° F. have been endured without damage. While this material is not to be classed, in any way, with the cheaper, expendable materials, it has a definite place where these qualities are needed.

Flexible molds in quantity

The nature of vinyl chloride plastisols fits them to different mold constructions than those for rubber or old style vinyls. Since they are poured easily and quickly and cured with little or no shrinkage, much heavier sections may be used. The sleeve and cloak constructions, to be peeled off the casting, do not carry over from rubber since vinyl chlorides are tender when hot and deteriorate if overflexed in that state. When this type construction is unavoidable, a slight overcure of the plastisol adds strength, but for most purposes piece molds can be made which are easier to fill and clear, yet deliver virtually flash-free castings. Solid molds of two or more pieces have been made in fair size, produced by pouring over prepared positives of each mold part so that a complete mold is made in each pouring. When a group of such positives is cast in metal a quick method is provided of turning out flexible molds in quantity without difficulty.

The use of broad sealing edges insures sharp register and makes cavities self-sealing under pressure. When the object cast is large enough to distort flexible materials when filled, backings of fused-on stiffer formulations may be used. If the mold is in separable form, the backing may be plaster or sprayed metal. The latter is preferable both for its reduced bulk and the dissipation of exothermic heat. Although poorer conductors of heat than metal, the vinyls are still far superior to

ORIGINALS BY ROBERT COOK, SCULPTOR

Crocodile for garden or pool is cast in one-piece mold using a plastic support (not shown). Frogs shown are cast in single cavity solid, single cavity slit, or hot dip molds with plaster support

ORIGINALS BY LOUIS BAER

Architectural ornaments containing decorative detail are cast in open one-piece molds. Note undercuts and glossy mold surface

Heat-resistant polyester mugs are cast in one-piece molds using plaster supports. Various fillers can be used for insulation

plaster; when combined with metal backings they can be fairly well cooled by air circulation. Meeting edges of the mold cavity should be prolonged between the meeting points of the backing, so that pressure upon the latter will tighten the seal as the mold is filled.

Ideal mold construction for most purposes, and by far the most adaptable, is a combination of rigid and flexible parts, using sealed sprayed metal or metal inserts to hold plane surfaces and dimensions. This may be visualized as either a flexible mold with metal inserts or as a sprayed metal mold with holding flexible inserts. In each case, the flexible portions should contain all areas where there is a question of release—either because of undercuts or the shrinkage factor mentioned earlier—and provision should be made to renew these portions whenever necessary since their working life will be considerably shorter than that of the metal.

"Push out" areas to simplify removal of castings can be placed in flexible portions. In lieu of added backings or supports, the sections where there is possibility of distortion can be made of metal. With such constructions there is almost no limit to the size and intricacy of castings produceable, and close tolerances can be maintained. By keeping adequate positives for both metal and flexible parts available, replacements and additions can be prepared as needed with minimum loss of time and the least interference with production schedules.

Separating agents

Although many polyesters release directly from sealed metal or flexible vinyl, the use of separating agents is advisable. Even with glass, they improve release. It is possible to incorporate a separating agent directly with the casting resin, but this is not usual practice. The ordinary range of mold lubricants is entirely useless since many react with or are dissolved by the various resins.

Some special preparations such as Ortholeum (7), Vejin (20), and Polyplastex #595 (21), have been recommended. In the writer's experience, silicone mold release fluids seem to give better results (22,23), but these, or any other agent, must be used in minimum quantity. Dilution and allowing the solvent to evaporate before using the mold, is very desirable and permits application by atomizer or spray gun. One modified silicone comes ready prepared with solvent for such use, and contains additional active agents which aid in obtaining firm surfaces and easier release (3).

None of these coatings require frequent renewal, but care should be exercised to prevent careless finger prints or smears on the surfaces of prepared molds.

Inexpensive multiplicity

It is obvious that these types of molds and mold materials are a far cry from the expensive precision mechanisms required for injection molding. It is equally clear that a full understanding of the mold materials and their use is almost as important to the resin caster as the catalyses of his resins. Polyesters have in the past failed to fit into the established scheme of production, and new tools have been needed, tools based upon inexpensive multiplicity rather than the expensive and unique. Without question these tools can and will be subject to improvement just as the resins themselves will improve.

But pertinent to the manufacturer is the salient fact that polyester resins exist; that their cure is simplified enough so that, with proper care and preparation, production runs can be undertaken; and that there are mold materials in which the resins can economically be cast. It is added profit that with such molds castings may be produced in a variety and complexity that no other method of practical production can hope to equal.

Material Sources

1. Cerro de Pasco Copper Corp., 40 Wall St., New York, N. Y.
2. Glyco Products Co., 26 Court St., Brooklyn, N. Y.
3. Multi-Mold Products, 18 West 37th St., New York, N. Y.
4. U. S. Stoneware, Akron 9, Ohio.
5. Durite Plastics, Inc., Frankford Station P.O., Philadelphia, Pa.
6. Dow Chemical Co., 30 Rockefeller Plaza, New York, N. Y.
7. E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.
8. Hercules Powder Co., 921 Market St., Wilmington 99, Del.
9. Kelco Company, 31 Nassau St., New York, N. Y.
10. American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.
11. Palestic Corp., 316 North Laflin St., Chicago, Ill.
12. American Resinous Chemicals Corp., Peabody, Mass.
13. Resinous Products & Chemical Co., Washington Sq., Philadelphia, Pa.
14. Irvington Varnish & Insulator Co., Irvington, N. J.
15. Naugatuck Chemical Div., 1230 6th Ave., New York, N. Y.
16. Bakelite Corp., 30 East 42nd St., New York, N. Y.
17. Perma-Flex Mold Co., 243 North 5th St., Columbus, Ohio.
18. Fleximold Company, 43 Wooster St., New York, N. Y.
19. Applied Resins Corp., 304 Oraton St., Newark, N. J.
20. Vijin, Inc., Cincinnati, Ohio.
21. Polyplastex Co., Woodside, L. I., N. Y.
22. Dow-Corning Corp., Empire State Bldg., New York, N. Y.
23. General Electric Co., Pittsfield, Mass.

CYANAMID MAKES MARKETS

IT STACKS HIGH, LIGHT AND HANDSOME

—It's tableware molded of MELMAC*

WITH EARTHENWARE OR CHINA, dish-handling is a heavy chore to a waitress . . . a heavy expense to management.

But by using tableware molded of MELMAC, a special compound developed by Cyanamid research, employees find dish-handling easy, and management cuts operating costs. MELMAC tableware, light and designed for better "stacking," is easy to handle and store.

And here are its other advantages:

. . . Resists breakage, chipping or cracking even under inexperienced handling.

. . . Full range of lustrous colors, from white to ivory, pastel to brilliant, go clear through, they are not merely on the surface.

. . . Unharmed by hot water (won't soften under heat) and unaffected by strong soaps or detergents, it can be easily and safely washed by hand or machine.

. . . Smooth-as-satin finish, like finest china.

. . . Clean appearance makes an appetizing background for food.

. . . Tasteless and odorless; and, by contrast to china or pottery, practically noiseless.

. . . Keeps food hot or cold, as desired, due to low heat conductivity.

Tableware molded of MELMAC plastic is new and special. So, when buying it, be sure to have the salesman explain how to treat it for best results and longest life. Ask him for informative leaflets that will help you and your employees get the most out of this handsome, durable, and economical tableware.

We will be glad to send you the list of manufacturers now specializing in MELMAC tableware. Write today to American Cyanamid Company, Plastics Department, 30-32 Rockefeller Plaza, New York 20, New York.

Cyanamid
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PLASTICS DEPARTMENT, AMERICAN CYANAMID COMPANY

*MELMAC is American Cyanamid Company's registered U.S. trade-mark for condensation products of aldehydes and amines.

Typical of American Cyanamid Company's promotional activity to create and broaden markets for end products made of MELMAC (thermosetting compounds of melamine-formaldehyde) are the two advertisements shown here. These are representative of selling campaigns appearing in

FOR MELMAC* PLASTICS...

If buttons

take you

to the cleaners...

specify those made of MELMAC*

Buttons made of MELMAC *thermosetting* plastic can be dry-cleaned over and over and over again—until, perhaps, there may be practically nothing left of a garment *but* the MELMAC buttons. And what a difference this makes in satisfied customers!

And MELMAC buttons won't stain or discolor, peel, warp, crack or chip when they are washed or ironed. They are easy to clean . . . easy to *keep* clean. Their color and finish are permanent, too.

Yes . . . men's, women's and children's clothes have additional sales appeal in a number of ways when you add durable, washable, dry-cleanable MELMAC plastic buttons. And what's just as remarkable about MELMAC buttons is *this:* their cost is low . . . a mere fraction of the cost of ocean pearl.

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Cyanamid
Plastics

DEPARTMENT OF AMERICAN CYANAMID COMPANY

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such publications as TIME, RESTAURANT MANAGEMENT, DAILY NEWS RECORD, INSTITUTIONS, DEPARTMENT STORE ECONOMIST, CHAIN STORE AGE, and in the Plastic Department's own publication, THE PLASTIC NEWS FRONT (circulation 15,000).

*MELMAC is American Cyanamid Company's registered U. S. trade-mark for condensation products of aldehydes and amines.

BURIED
but very much
"ALIVE"!

Buried into the body of the Durez plastic formulation described herewith — is Claremont Flock!

Strange — but true — the good that Claremont Flock does, comes to life after "burial" . . . the sinewy flock-filler particles distributed beneath the surface, produce greater impact strength, dissipate heat and help measurably to keep top surfaces comfortably cool to the hand.

Carefully graded cotton fibres provide specification-strengths. Repeated bulking tests during manufacture assure quality control. Processed in both white and black . . . the black as demonstrated here is for general purpose industrial requirements. Ample samples, details and prices upon request. Inquiries invited!

Claremont acknowledges, with sincere appreciation, the cooperation extended by America's leading plastic materials manufacturers. Through their helpfulness, we have been enabled to show many excellent flock-filled applications.

In 1936, Ironrite Ironer engineers and Kurz-Kasch, Inc. (custom molders) cooperated in the redesign of the Feedboard and Thermostat Control reproduced hereon. Of great significance is the fact that for twelve years, the Durez formulation used has performed so well as to require no changes. Claremont Flock's service to this application shares the satisfaction of all concerned!

Photos Courtesy Durez Plastics & Chemicals, Inc. North Tonawanda, N. Y.

CLAREMONT
FLOCK
THREAD
FABRIC
CORD

CLAREMONT
THE FILLER IS THE HEART

WASTE MANUFACTURING CO.

"The Country's Largest Manufacturer of Flock" CLAREMONT, N. H.

TECHNICAL SECTION

Optical Lens Coatings

by HAROLD W. COLES, WALTER F. SCHULZ, SYLVIA LEVY, and THOMAS A. WHEATLEY*

Twenty-nine coatings, spun on glass, have been given various mar and abrasion tests to determine if any one method can be considered reliable for comparing "soft" and "hard" plastics. It is concluded that the physical properties of the many plastics are so greatly different that no one test procedure can be considered satisfactory. Test methods employing such soft abrasive materials as cotton and cheese-cloth give erratic results because of a polishing action, particularly noticeable with soft plastics. A given group of coatings will not necessarily rank in the same order for different mar and abrasion tests.

Allymer CR-39 coating was the most resistant of all the coatings to marring. It has the disadvantage of requiring curing in an inert atmosphere. An alkyd-modified melamine is considered second best and requires no inert atmosphere. Vibrin-1305, diallyl phthalate, and a combination of CR-39 (Dd) and diallyl phthalate, were also quite resistant. Silicone-2103, 3,3,5-trimethyl cyclohexyl methacrylate, and Kotol coatings proved to be the most resistant to roof exposure and water immersion. End use should be stated before recommendations can be made for optical coating applications.

A COMPARATIVE study of the mar and abrasion resistance of some 50 plastic and resin compositions, applied as surface coatings on glass, was made as one phase of a survey of the protection of polished glass from the effects of weather, sparks from grinding wheels, flying abrasive particles, and other possible sources of damage. Another objective was the assembling of data to further the tropicalization program on optical instruments.

The materials tested are listed in Table I (next page). Polymers were used when soluble in cyclohexanone or isophorone, otherwise the monomers alone or in solution were cured on the lenses. The VYDR Vinylite (No. 1) is compounded for surface coating application. The VYHH formulation (No. 2) is said to be the best of the Vinylite surface coating formulas for solution application. The silicate coating applied to Lucite (No. 21) and to Vinylite VYHH (No. 22) will be described elsewhere. The authors to date have not found it possible to spin satisfactory optical coatings from Kriston, Laminac 4122, and BCM.

It was found that spin coating produced the most satisfactory optical films; hence, this report deals only with spinning procedures applied to 50 mm. flat lenses, although a variety of other methods was investigated[1]. In spin coating an excess of lacquer or varnish is thrown off a rotating object by centrifugal force; the remaining lacquer or varnish forms the coating.

The nature of a coating depends on many factors. For example, it is evident that the thickness of a coating depends among other things on the speed and the time of spinning[2]. The lacquers found most useful for lenses are usually spun for 30 sec., the chuck reaching a maximum speed of 1000 r.p.m.[3] (controlled by a Variac and a Strobotac) in 5 to 8 seconds. Figure 1 illustrates the laboratory setup for all spinnings.

The lenses are held by a vacuum chuck which, because of its universal adaptability[4], has been more useful than mechanical chucks among which was an expansion collar type chuck obviously limited to just one type and size of lens[5]. After a clean[6] lens,

*Bausch & Lomb Optical Co., Rochester 2, New York.

[1]Such as dip-coating, brushing, spraying, etc.

[2]If speed and time of spinning remain constant, the thickness of a coating is largely determined by the viscosity.

[3]Depending on the viscosity of the lacquer, the speed of spinning may be decreased to 800 r.p.m. or increased to whatever speed is best.

[4]The vacuum chuck may be used not only with flats and spherical surface lenses, but also with toric lenses and welding plates, if special adapters are attached.

[5]Such as binocular objectives No. 7B.

[6]Any good cleaning method that removes all dirt and particularly all microscopic particles of dust or lint is acceptable. Whether cleaned with soap or any other degreasing or surface tension lowering agent, the lens is moistened, polished with a dry towel or "shiner" and blasted with filtered, dry compressed air (60 lb.) to remove lint. If compressed air is not available, brushing the spinning (200 r.p.m.) lens first with a solvent-soaked long-fiber cotton swab and then with a small, flat, lint-free horsehair brush will remove lint. It is assumed that coated lenses will be discarded just like uncoated ones, after they have become sufficiently spattered or otherwise defective. Prescription lenses should, however, stand re-coating as often as required. A lens is best de-coated by heating it in a beaker with 95% sulfuric acid to which about 1% of concentrated nitric acid has been added. The bath should have a false bottom (a desiccator plate with legs is suitable) to keep lenses from lying flat on the bottom of the beaker. The lenses are removed from the acid bath, cooled, and then thoroughly rinsed individually under running water. The acid bath method of de-coating lenses has the drawback of requiring a hood not available in most shops and of failing in a few instances, notably with silicones and some vinyls.

In an alternative method, the lenses are covered completely with scalding water and allowed to stand for 24 hr. or longer. To facilitate the action of the water, the edge of the coating should be loosened with a razor blade.

A third method is applicable only to thermoplastic coatings. Cyclohexanone (or some other solvent), preferably hot, may be used to soak the lenses, followed by an acetone rinse and finally given a regular wash.

TABLE I.—Materials Tested

No.	*Material*	*Type*	*Source*
1	Vinylite VYDR (clear)	93-95% polyvinyl chloride. Formerly VYNW.	Bakelite Corp.
2	Vinylite VYHH (clear)	85-88% polyvinyl chloride	Bakelite Corp.
3	Lucite HG-1	Methyl methacrylate compression molding	E. I. du Pont de Nemours & Co., Inc.
4	Cellulose acetate	Color K75027, comp. 19100. Lot 720.	Tennessee Eastman Corp.
5	Ethyl cellulose	N-7, 6 cps., 47.8% ethoxyl.	Hercules Powder Co.
6	Styron	Polystyrene, NA4-K88, No. 42808M.	Dow Chemical Co.
7	Melamine lacquer	Alkyd-modified. Melmac 586-9.	Strathmore Products
14	Allymer CR-39	Allyl diglycol carbonate	Columbia Chemical Div., Pittsburgh Plate Glass Co.
15	Vibrin-1305		Naugatuck Chemical Co.
17	Polectron	Polyvinyl carbazole	General Aniline and Film Corp.
21	Lucite HG-1 + silicate	Silicate coating is spun upon a coating of methyl methacrylate.	
22	Vinylite VYHH + silicate	Silicate coating is spun upon a coating of VYHH.	
23	Cerex	Comp. 214, No. II 5540-14, solvent purified, lot A786.	Monsanto Chemical Co.
24	Norton resin	Cross-linked methyl methacrylate composition.	E. I. du Pont de Nemours & Co., Inc.
25	Uncoated glass	50 mm. plano industrial goggle lenses.	Bausch & Lomb Optical Co.
26	Diallyl phthalate	Diallyl phthalate prepolymer	Shell Development Co.
27	Forticel	Cellulose propionate, amber color, lot 28102.	Celanese Corp. of America
31	Melmac 245-8	Lot B-2281	American Cyanamid and Chemical Corp.
32	Isobutyl methacrylate	Combined with Pentalyn (Hercules Powder Co.) (39.4%) and benzoyl peroxide (0.6%).	
33	Dimethyl itaconate	Combined with equal part of methyl methacrylate.	Dimethyl itaconate from Chas. Pfizer and Co.
34	Cellulose nitrate	No lot designation.	Hercules Powder Co.
35	Silicone 2103	Viscosity—0.66 poises at 25° C. Solids—60%, lot W-21.	Dow Corning Corp.
37	Lucite sheet + silicon tetrachloride	The tetrachloride in alcohol solution is spun on Lucite disks.	
39	Allymer CR-39 Dd plus diallyl phthalate	Diallyl phthalate (12%) and benzoyl peroxide (3%)	
42	n-Butyl methacrylate	Combined with Pentalyn (39.4%) and benzoyl peroxide (0.6%).	
43	3,3,5-Trimethyl cyclohexyl methacrylate		Eastern Regional Research Laboratories
45	Kotol	Liquid coating. Solids—29.83% W736A. Con. 537.	Naugatuck Chemical Co.
46	Selectron-S5026	Batch No. 7239.	Pittsburgh Plate Glass Co.
47	Cyclohexyl methacrylate	Prepared by ester interchange.	

laid on the rubber gasket[7] of the vacuum chuck, has been centered by cradling the lens in a movable collar and pushing the latter into a fixed guide, it is secured by opening the vacuum line. The steps which follow depend upon the type of lacquer used.

Lacquers made with low boiling solvents form a good coating only if such an excess[8] is used that the lacquer levels out smoothly and submerges completely the whole surface of the lens prior to spinning. Such an excess of lacquer is kept from run-

[7] Inside diameter ⅞ in.; outside diameter 1⅛ in.; ⅛ in. O-ring.

[8] 4.5 gm. of lacquer per spin on convex surface of 7B objective.

TABLE II.—Test Results on Coated Lenses

(1) Coating No.	(2) Type of Coating	(3) Concentration in solvent	(4) Solvent	(5) Ease of spinning	(6) Time of baking	(7) Baking temperature	(8) Inert atmosphere required	(9) Arlington wipe test	(10) Taber cotton plug	(11) Taber abrasive wheels	(12) Carborundum drop, before cleaning	(13) Carborundum drop, after cleaning	(14) Tumbling sand	(15) Spark test	(16) Roof exposure	(17) Water immersion
		%			min.	°C.									days	days
1	Vinylite VYDR	13	Cyclo-hexanone	Slightly difficult	60	150	No	1	1		6	5	11	2	43	0.4
2	Vinylite VYHH	25	Isophor-one	O.K.	60	135	"	1	2	3	6	3	10	2	9	1.75
3	Lucite HG-1	18.6	Isoph. + cyclohex-anone	O.K.	60	132	"	1	1	3	8	4	8	3	9	1
4	Cellulose acetate	14.6	"	O.K.	60	132	"	2	1	2	5	3	8	4	9	0.5
5	Ethyl cellulose	20.5	"	O.K.	30	132	"	3	2	6	8	6	11	6	9	0.75
					30	150										
6	Polystyrene	25	Isophor-one	Cob-webs	60	135	"	3	2	7	9	7	12	3	9	0.4
7	Melamine (mod.)	51	"	O.K.	60	150	"	1	1	3	6	1	9	1	43	4
14	CR-39	100	No	O.K.	90	83	Yes	1	1	1	5	1	6	1	43	3
					90	150										
15	Vibrin-1305	85	Isophor-one	O.K.	120	150	No	1	1	2	8	3	6	1	64	30
17	Polectron	32.6	"	Difficult	150	100	"	3	4	8	10	7	10	4	14	0.5
21	Lucite HG-1 + silicate	Very dilute			15 hr.	97	"	1	1	3		3	7	5	1	0.4
22	Vinylite VYHH + silicate	"			15 hr.	65	"	1	1	3	6	3	9	5	4	0.4
23	Cerex	20	Isophor-one	Slightly difficult	60	150	No	2	2?	6	5	5	11	3	1	2.5
24	Norton resin	3.5	"	Difficult	60	150	"	1	2	4	8	4	6	2	11	2.5
25	Uncoated glass	—	—	—	—	—	—	1	1	1	4	1	3	7	—	—
26	Diallyl phthalate	100	No	O.K.	120	90.3	No	1	1	2	7	5	9	2	230	8
					180	153										
27	Forticel	12.5	Isophor-one	O.K.	60	150	No	1	1	6	8	5	9	3	19	1.5
31	Melmac 245-8	50.8	"	O.K.	60	150	"	2	1		7	2	8	2	35	30
32	i-Bu methacry-late + pentalyn	100	No	Difficult	16 hr.	65	"	5	1	5	10	8	11	4	28	4
33	Dimethyl itaconate	36.5	Isophor-one	O.K.	15 hr.	100	"	3	2	5	9	5	7	3	7	2
34	Cellulose nitrate	9.4	"	O.K.	60	125	"	1	1	3	8	4	9	2	8	0.5
35	Silicone-2103	62.3	"	O.K.	60	70	"	1	5	6	9	5	9	8	Crazed	56
					60	135									94	
					180	235										
37	Lucite sheet + $SiCl_4$	—	—		Over night	70	"	1	1	2	6	3	5	7	—	—
39	CR-39 Dd + diallyl phthalate	100	No	Difficult	90	80	Yes	1	1	2	7	1	Peeled	2	47	31
					90	120										
42	n-Bu methacry-late + pentalyn	100	"	Difficult	16 hr.	65	No	4	2	7	9	6	9	4	106	19
43	3,3,5-Trimethyl cyclohexyl methacrylate	10	Isophor-one	O.K.	60	150	"	2	1	7	8	6	Peeled	3	O.K.	79
															265	
45	Kotol	?	Isophor-one	O.K.	60	150	No	1	1	5	10	6	8	3	89	58
46	Selectron	100	No	Difficult	120	70	Yes	1	4	8	9	4	8	4	O.K.	3
					60	100									234	
47	Cyclohexyl methacrylate	22.8	Isophor-one	O.K.	60	150	No	3	3	5	8	5	6	4	11	

1 — Apparatus for spinning optical coatings

ning down the side of the lens by a tight sleeve[9] which can be lifted off without any objectionable spill-over just an instant before spinning, or it can be taken off within a fraction of a second after the chuck has started to turn.

The preferred method of spin coating is applicable to lacquers made from high-boiling solvents. Here the optic is not inundated with lacquer; instead, a small blob[10] of the latter is placed on the centered lens. It should be pointed out that while a center lens spin coats better than an uncentered one, more important is the centering of the blob of certain sensitive lacquers with respect to the chuck. For that purpose, the cover of the movable centering collar is provided with a hole centered with respect to the chuck, and tapered to fit the tip of a 50 ml. hypodermic syringe. The amount of lacquer discharged from the syringe is controlled through a cut-out in the cover. In this manner, the lacquer is centered with respect to the chuck. This is especially useful for non-circular, odd-shaped lenses which cannot be centered without a special collar. An amount of lacquer large enough to flow out until it is the size of a nickel or quarter is deposited on the lens. Spinning then spreads it slowly in the manner of a uniformly expanding circle until the whole lens is covered; further spinning throws off the excess. Less sensitive lacquers need not be applied with a centered hypodermic syringe. They can be poured on the lens from a small beaker provided the lip of the beaker is not more than 2 to 3 mm. above the lens (to avoid the introduction of air bubbles). Excess lacquer is caught by a throw-off basket[11] which also serves as a guard against flying glass.

[9]The sleeve is put on after the centering collar has been removed; friction tape has been used as a sleeve, for a metal ring sometimes pulls up a large bubble (like a soap bubble). Disposable paper sleeves have not been tried.

[10]Weighs 0.4 to 0.7 gram.

Discussion of lacquers

The thermoplastic polymers and the thermosetting monomers were dissolved in solvents as follows:

A. In low boiling solvents.
   1. One low boiling solvent.
   2. A mixture of low boiling solvents.
   3. A mixture of high and low boiling solvents.
   4. A low boiling monomer.

B. In high boiling solvents.
   1. One high boiling solvent[12].
   2. A high boiling monomer.

For purposes of spin coating, a low boiling monomer is one that boils not higher than 150° C. (acetone, *n*-butanol, xylol, amyl acetate); the high boiling solvents are cyclohexanone (155° C.), γ-valerolactone (206° C.) and isophorone (215° C.). The latter has been preferred.

The difference in methods of spinning lacquers with low and high boiling solvents has been described above. It is peculiar to spin coating that a lacquer containing both classes of solvents usually acts more or less like one with only a low boiling solvent.

Low boiling monomers were substituted for low boiling solvents with discouraging results. The monomers were: a mixture of vinyl acetate (72° C.) and methyl methacrylate (100° C.), and styrene 146° C.[13].

High boiling monomers (like diallyl phthalate and Allymer CR-39)[14], on the other hand, act like high boiling solvents in spinning. The main requirement of such a solvent is a low enough vapor pressure so that during spinning, which offers optimum conditions (other than heat) for fast evaporation, the change in concentration of the lacquer is negligible.

Whatever correlation may exist between viscosity and usefulness in spin coating, no viscosity measurements were made for the purpose of establishing a relationship, primarily for the reason that many of the plastics tested obviously were not suited as protective coatings. While it is granted that a given plastic can be dissolved in a given solvent in such a proportion as to yield a lacquer with optimum viscosity for spinning, it is plain that the numerical determination of such optimum viscosity is vitiated through evaluation by judgment alone of the optical quality of the coating.

(*Please turn to page* 167)

[11]A 13½ in. diameter metallic basket has been found convenient for lacquers made from a high boiling solvent. It can be cleaned at intervals or it can be fitted with a disposable lining for occasional removal of waste. It is hardly economical to recover the lacquer for re-use.

[12]Frequently lacquers with one high boiling solvent (isophorone) contain negligible amounts of low boiling solvents. Their presence is due to the necessity of preparing the lacquer with a solvent like acetone (to dissolve the resin or plastic) and then replacing the acetone by a high boiling solvent by preferential distillation or evaporation (passing an air-stream through the lacquer).

[13]Both the vinyl acetate and the methyl methacrylate were in a copolymer combination of increased viscosity; the styrene was present in Laminac 4122, Vibrin-103, U.V-101, and Selectron.

[14]Diallyl phthalate was used in the form of its pre-polymer; CR-39 in a viscous but not gelled stage. It is more satisfactory to increase the viscosity of CR-39 under the influence of time than by the use of heat.

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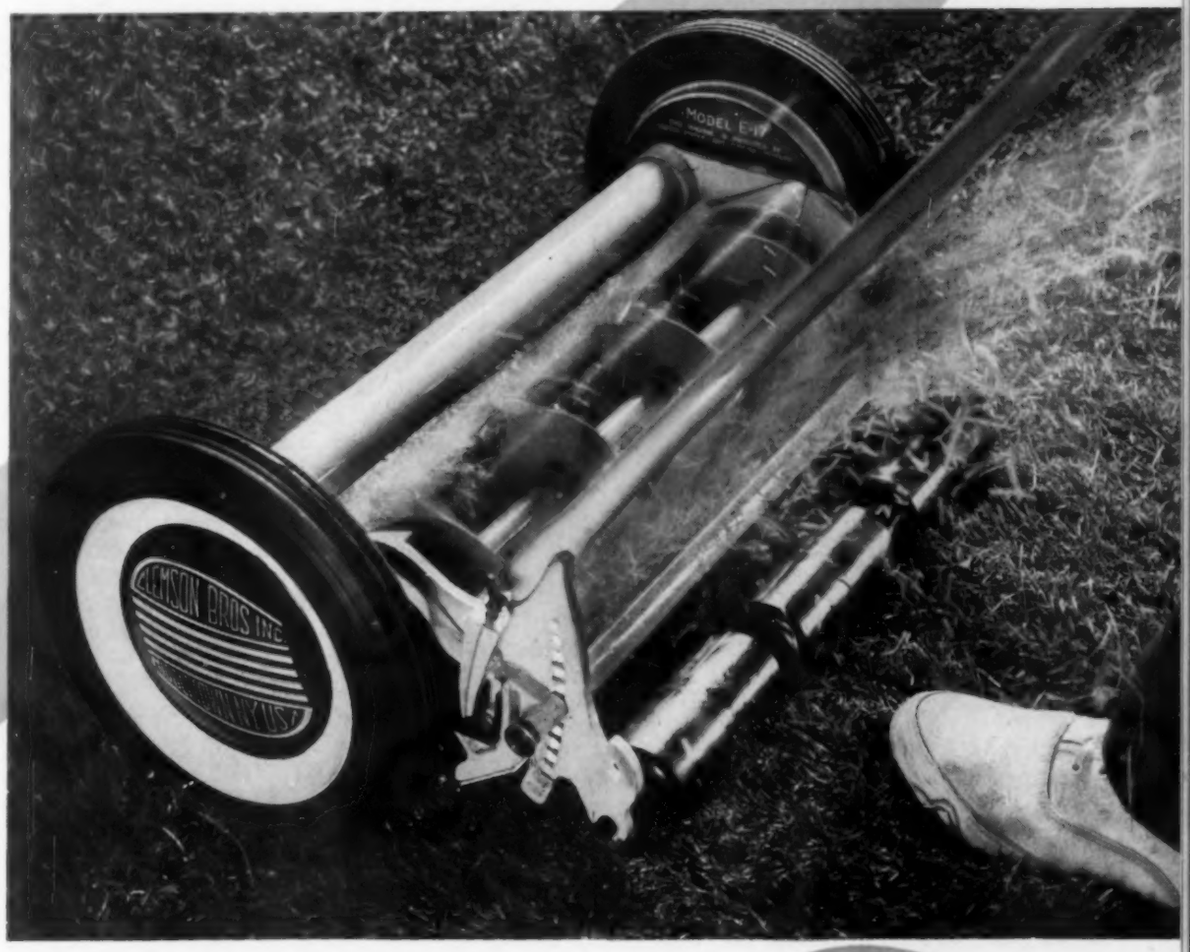

• Clemson E-17 lawn mower manufactured by Clemson Bros., Inc., Middletown, N. Y.

• Information regarding Tenite is obtainable through representatives located in Chicago, Cleveland, Dayton, Detroit, Leominster, Mass., Los Angeles, New York, Portland, Ore., Rochester, N. Y., St. Louis, San Francisco, Seattle, and Toronto, Canada; and elsewhere throughout the world from Eastman Kodak Company affiliates and distributors.

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Materials

FURFURAL AND ITS DERIVATIVES. H. R. Fleck. Plastics (London) *11*, 534-40 (Oct. 1947). The chemistry of furfural and its derivatives is reviewed. Phenol- and urea-furfural resins are considered briefly.

COATINGS ON KRAFT. L. Teitell and S. Berk. Modern Packaging *21*, 165-7, 202 (Dec. 1947). Solvent-type resinous coating materials without and with pentachlorophenol and salicylanilide as fungicides were applied to kraft paper and tested for moisture- and fungus-proofing properties. A para-phenyl phenol-formaldehyde resin varnish without a fungicide offered good fungus resistance to the papers when tested with four species of fungi. The addition of 5% pentachlorophenol gave slightly increased protection. The application of the coating materials to the kraft paper decreased the tearing resistance, but increased the bursting strength of the papers. Two of the coating materials increased the moisture resistance of the kraft paper.

POLYAMIDES. A. G. Hovey. Modern Packaging *21*, 143-8, 196, 198 (Oct. 1947). Resins suitable for hot-melt and hot-seal coatings are described. Detailed data on plasticizer compatibility, resin compatibility, and solubility are presented. The use of these resins in packaging applications is described in detail.

RESORCINOL-FORMALDEHYDE ADHESIVES. R. A. Glauert. British Plastics *19*, 333-9 (Aug. 1947). The synthesis, properties and applications of resorcinol-formaldehyde resinous adhesives are reviewed; 24 references.

CONTACT-PRESSURE LAMINATES. Plastics (London) *11*, 407-8 (Aug. 1947). The types of resins and technique for making contact-pressure laminates are reviewed.

Molding

ELECTRONIC BOX STAYER. Modern Packaging *21*, 113-16, 202 (Feb. 1948). A commercial machine which seals cellulose acetate plastic sheet through a controlled high-frequency heating technique is described.

RHEOLOGICAL PROBLEMS IN THE PROCESSING OF PLASTICS. R. Buchdahl and H. K. Nason. Ind. Eng. Chem. *40*, 642-50 (Apr. 1948). Various methods of measuring the flow properties of plastic systems, covering a wide consistency range, are described. The problem of obtaining material constants which are independent of the instruments used is given particular attention. Because the viscosity coefficient of most high-polymeric systems is not only a function of temperature but also a function of time, shearing force (or rate of shear), and previous history, it is important to obtain a complete evaluation of the flow properties, in order to establish a satisfactory correlation between them and the processing behavior. It is shown how the flow properties affect—and to some extent determine—the processing behavior of plastic systems. Because of the lack of extensive quantitative data it is possible to give only a qualitative discussion. The following processes are considered in some detail: extrusion, molding, calendering, and coating of surfaces.

Chemistry

IMPROVED POLYMERIZATION TECHNIQUES. S. A. Harrison. Analytical Chem. *20*, 49-51 (Jan. 1948). A procedure is described for the precise and accurate sampling of latex during the course of an emulsion polymerization without interrupting the reaction. The sampling device, which consists of a hypodermic syringe equipped with a stopcock, and a "stirrup" for stopping the plunger, is used in conjunction with puncture-sealing caps or closures on the polymerization vessels. The technique is simple and rapid and of general applicability. It is particularly useful for following the progress of a polymerization by determination of total solids and for removing samples for special investigations such as mercaptan analysis or gel and intrinsic viscosity studies.

IMPROVED POLYMERIZATION TECHNIQUES. S. A. Harrison and E. R. Meincke. Analytical Chem. *20*, 47-8 (Jan. 1948). A method of conducting emulsion polymerizations in beverage bottles equipped with special puncture-sealing gaskets is discussed. The sealing gasket is described in detail and the advantages realized through its use are pointed out. With this type of closure, materials can be injected against pressures up to 70 p.s.i. or more by means of a hypodermic syringe. The pressure in the bottle can be determined quickly by a gage equipped with a hypodermic needle. From the pressure measurements, the percent conversion of monomers to polymer can be determined over a wide range with good accuracy.

POLYMERIZATION REACTIONS OF β-PROPIOLACTONE. T. L. Gresham, J. E. Jansen, and F. W. Shaver. J. Am. Chem. Soc. *70*, 998-9 (Mar. 1948). The polymers of β-lactone are polyester acids. The polymerization is markedly catalyzed by certain acids, bases and salts. The polyester acids are characterized by pyrolysis to acrylic acid and by alcoholysis to hydracrylates.

Properties

PERMEATION THROUGH AND SORPTION OF WATER VAPOR BY HIGH POLYMERS. P. M. Hauser and A. D. McLaren. Ind. Eng. Chem. *40*, 112-17 (Jan. 1948). Recent studies of water vapor transmission by high polymers indicate that the permeability constant P can be broken down into two factors, D, the diffusion constant, and S, the solubility coefficient. The derivation of this expression depends on the assumption that Fick's law and Henry's law are obeyed. Determination of S and P for a variety of polymers—including nylon, regenerated cellulose, and vinyl polymers, such as polyethylene and vinylidene

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chloride-acrylonitrile copolymer—showed that Henry's law is not obeyed except for the vinyl polymers below 50% relative humidity and that P is usually not a constant as the vapor pressure changes. The values of S were obtained from the water vapor sorption isotherms in air. These findings make the expression P = DS useful for describing the behavior of the vinyl polymers only at low relative humidity.

GREASE RESISTANCE. C. G. Lavers. Modern Packaging *21*, 147-9 (Mar. 1948). A method to determine the grease resistance of various packaging materials is described. The results obtained with various paper products, glassines, cellophanes and seven types of thermoplastic films are reported.

PROPERTIES OF POLYORGANOSILOXANE SURFACES ON GLASS. M. J. Hunter, M. S. Gordon, A. J. Barry, J. F. Hyde, and R. D. Heidenreich. Ind. Eng. Chem. *39*, 1389-95 (Nov. 1947). A variety of organosilicon films were applied to glass surfaces. Contact angle with water, surface resistivity, and dry lubrication of the treated surfaces were invariably found to be considerably increased over the values for untreated glass. Contact angles of 90-110° were readily obtained from a wide selection of organosilicon structures with no marked systematic variations between species. The coefficient of friction for glass surfaces treated with a series of alkyltrichlorosilanes decreased progressively as the length of the alkyl chain increased.

Testing

A VARIABLE-SPAN FLEXURE TEST JIG FOR PLASTIC SPECIMENS. B. M. Axilrod, R. W. Thiebeau, and G. E. Brenner. ASTM Bulletin *1947*, 96-9 (Oct. 1947). A flexure test apparatus is described for testing a plastic specimen as a simple beam loaded at the center. The equipment is designed so that the span may be quickly adjusted to the desired value with a calibrated screw. This facilitates testing specimens of different thicknesses at the same span-depth ratio. The application of a deflection lever with a recording extensometer for obtaining load-deflection graphs with the flexure apparatus is also discussed.

Synthetic rubber

MECHANISM AND THEORY OF VULCANIZATION. R. D. Stiehler and J. H. Wakelin. Ind. Eng. Chem. *39*, 1647-54 (Dec. 1947). Vulcanization is a process by which the intermolecular forces are increased through the introduction of polar groups, generally acidic in nature, into the rubber molecules. This is accomplished by the reaction of certain types of oxidizing agents with the alpha methylene carbon atoms or double bonds. These intermolecular forces are further increased with soluble divalent metallic compounds through the formulation of ionic valences between divalent metallic ions and polar acidic groups of the rubber vulcanizate. These divalent metallic ions may bridge the rubber molecules through ionic valences in the form of a salt. Intermolecular forces established during vulcanization give rigidity to the molecular structure, which retards plastic flow and crystallization of rubber molecules. They also are responsible for other characteristics of vulcanized rubber. The molecules in vulcanized rubber are presumably not joined by primary valence bonds through sulfur or oxygen bridges but retain their individual existence.

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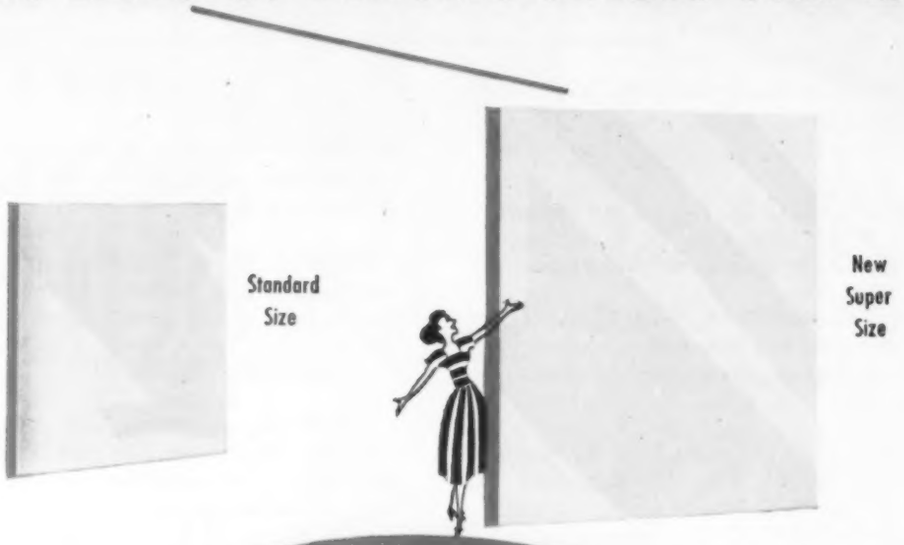

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U.S. PLASTICS PATENTS

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REGENERATED CELLULOSE. C. M. Rosser (to American Viscose Corp.). U. S. 2,436,181, Feb. 17. A regenerated cellulose pellicle containing guanidine thiocyanate.

PHOSPHORESCENT PLASTIC. G. T. Schmidling. U. S. 2,436,182, Feb. 17. An object of polymethyl methacrylate containing strontium sulfide, a stabilizer, a plasticizer, and a blue-green dye.

EXTRUSION. P. M. Cole (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,436,201, Feb. 17. A process for forming strain-free, thermally stable shapes from organic thermoplastic material.

COPOLYMERS. G. F. D'Alelio (to Pro-phy-lac-tic Brush Co.). U. S. 2,436,204, Feb. 17. A molecularly oriented fibrous copolymer of acrylonitrile and a vinyl ether.

ELASTOMER. F. B. Hill, Jr. (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,436,213, Feb. 17. An elastomeric copolymerizate of fluoroprene, a butadiene-1,3, derivative, and a vinylidene derivative.

FLAMEPROOFING. E. W. Leatherman. U. S. 2,436,216, Feb. 17. A flameproofing composition comprising a chlorinated resinous material, zinc oxide or ferric hydroxide, a higher fatty acid and a metallic soap.

TEXTILE PRODUCT. R. D. MacLaurin (to Industrial Rayon Corp.). U. S. 2,436,219, Feb. 17. A yarn treated with a composition of a hydrogenated fish oil and the reaction product of an alkylene oxide, a partial polyester of a fatty acid and a polyhydric alcohol.

SILICONE. J. Marsden and G. F. Roedel (to General Electric Co.). U. S. 2,436,220, Feb. 17. An elastomer comprising the heat-treated mixture of a dimethyl silicone gum and ferric chloride hexahydrate; and lead monoxide.

ADHESIVE. A. M. Neal and J. J. Verbanc (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,436,222, Feb. 17. An adhesive composition comprising an elastoprene, an organic diisocyanate, and non-reactive solvent.

INTERPOLYMERS. E. F. Wadley and J. T. Horeczy (to Standard Oil Development Co.). U. S. 2,436,238, Feb. 17. Olefins of different molecular weights are interpolymerized by heating with a mixture of boron fluoride and sulfuric acid.

POLYVINYL ACETAL. R. D. Dunlop (to Monsanto Chemical Co.). U. S. 2,436,253, Feb. 17. A composition comprising an alkaline polyvinyl acetal solution containing an alkali metal compound and an amine salt.

OLEFIN POLYMERS. W. E. Hanford and P. L. Salzberg (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,436,256, Feb. 17. Ethylene polymers are prepared by heating ethylene at 100 to 300° C. and 200 to 300 atm. in the presence of a hypochlorite.

RESIN EMULSION. P. K. Porter (to Westinghouse Electric Corp.). U. S. 2,436,328-9, Feb. 17. A resin emulsion containing water, organic solvent, phenol-aldehyde resin, and as emulsifying agent, a glycinin protein peptized with ammonium hydroxide.

PLASTIC COMPOSITION. L. P. Kyrides (to Monsanto Chemical Co.). U. S. 2,436,361, Feb. 17. A plastic composition of a cellulose derivative containing ethyl acetonyl phthalate plasticizer.

AMINOAMIDE RESINS. C. S. Marvel. U. S. 2,436,363, Feb. 17. Resins are obtained by reacting two mols of formaldehyde with one mol of glycinamide.

COATING. E. T. Clayton. U. S. 2,436,420, Feb. 24. A method for cladding ferrous metal surfaces with air-drying oil-modified polyhydric alcohol-polycarboxylic acid resin, then applying cashew nut shell liquid-paraformaldehyde reaction product.

FILM COATING. W. J. Jebens (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,436,433, Feb. 24. A coating for water-soluble polyvinyl alcohol film, containing polyvinyl acetal, an aliphatic aldehyde, an acid catalyst, and a volatile organic solvent.

MOLDING. C. W. Otis (to Noma Electric Corp.). U. S. 2,436,597, Feb. 24. A process for molding a plastic object having an insert with lateral extensions.

STYRENE POLYMERS. W. J. Sparks, H. B. Kellogg, and D. C. Field (to Standard Oil Development Co.). U. S. 2,436,614, Feb. 24. Vinyl aromatic hydrocarbons are polymerized in solution at temperatures between −78 and −103° C. in the presence of a Friedel-Crafts catalyst.

ALKYD RESIN. H. L. Gerhart and L. M. Adams (to Pittsburgh Plate Glass Co.). U. S. 2,436,641, Feb. 24. An alkyd resin prepared by heating dicyclopentadiene, maleic anhydride, and a glyceride drying oil.

POLYMERS. R. A. Gerlicher (to Jasco, Inc.). U. S. 2,436,767, Feb. 24. A polymerization process for olefins. operative between 0 and −110° C. in the presence of a Friedel-Crafts catalyst.

APPLICATOR. R. G. Ames (to G. W. Williams and S. Ames). U. S. 2,436,783, Mar. 2. A pressure applicator for feeding plastic material upon a surface.

POLYSTYRENE. A. J. Warner (to Federal Telephone and Radio Corp.). U. S. 2,436,841, Mar. 2. Styrene polymer is tested by dissolving in propylene oxide and precipitating with methanol.

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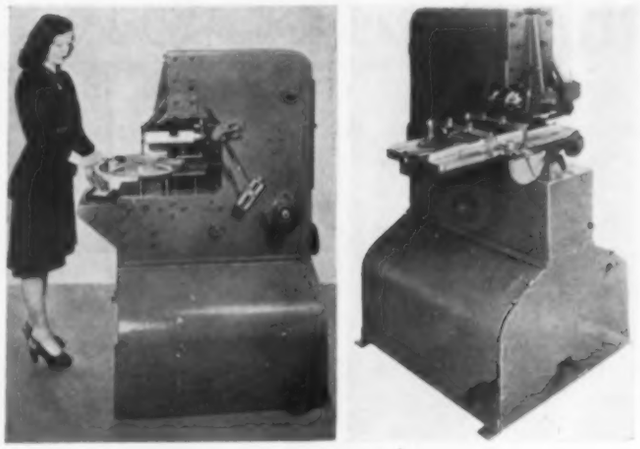
On standard models the ram is controlled by foot pedal or hand lever. Pressure on the pedal or lever moves the ram down; when pressure is removed, the ram automatically returns to power stop. A square control rod is serrated on the back side and equipped with mating stop collars to keep the collars from moving under pressure.

Electric heaters — For super-heating steam and preheating air and other gases used for processing, drying, vacuum packing, conditioning plastics powders, and other applications requiring dry heat, Edwin L. Wiegand Co., 7503 Thomas Blvd., Pittsburgh 8, Pa., is offering a new series of Chromalox heavy-duty electric heaters. Three sizes are available: Series 2 with 2-in. standard pipe, for single phase operation only; Series 3 with 3-in. standard pipe, for single or three phase operation; and Series 6 with 5-in. standard pipe, for single or three phase operation. Capacities range from 1 to 12 kw. and a number of automatic controls are available. The standard range is 200 to 550° F. and 100 to 1000° F.; others are available upon request.

Roll leaf stamping press — For stamping jobs where the requirements are unusually severe as to stamping speeds and pressures, and for work where the amount of dwell is important, as in the case of plastics, hardwood, and fibers, Peerless Roll Leaf Co., Inc., Union City, N. J., has introduced a new type roll leaf stamping press, Model AH. Press speeds may be regulated to operate through a range from 10 to 60 impressions per minute. Measuring 2 ft. 7 in. wide by 3 ft. 9 in. deep



by 5 ft. high, it has a throat opening depth of 10 inches. The head of the press can be adjusted by raising or lowering, providing a maximum height of 5 inches.

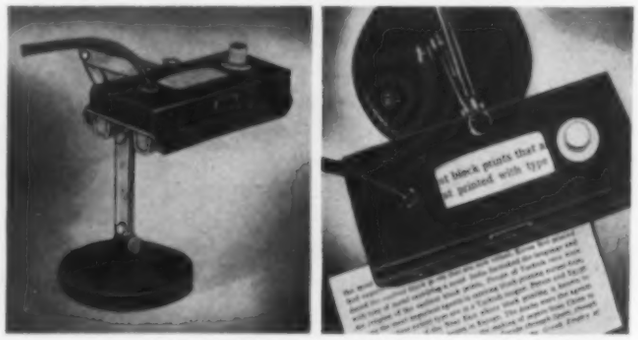
This new press is designed with a chain feed (right above), a 16-in. diameter dial table (left above), or a combination head and chase. The chain feed can operate under head from front to back of press, or left to right. Adjustable side gages permit feeding articles such as combs and paint brush handles so that impression may be registered accurately. An impression gage enables the operator to switch from thick to thin articles or vice versa and get a perfect stamping on the first impression. The dial table has eight stations and can be adjusted to move in 45, 90 and 180° arcs, thereby permitting stamping of large articles. The combination head and chase has a head 6 by 7 in., a die plate 6 by 7 in., and an inside chase size of 5 by 6 inches. The chase may be converted into a die plate by removing the wall of the chase.

Feeding table — Several improvements in its standard 10,000-lb. capacity portable hydraulic sheet feeding table have been announced by Lyon-Raymond Corp., 5570 Madison St., Greene, N. Y. It offers faster, more constant elevating speed and incorporates the use of two vertical hydraulic cylinders which are synchronized by a toggle lever arrangement. The table top remains level at all times even under off-center loads. The platform is 36 in. wide by 96 in. long, has a lowered height of 22 in. and an elevated height of 34 inches.

Automatic enameling — Enameling the raised faces of letters, numbers, or designs on such items as signs, frames, end plates, license plates, name plates, and other molded plastic products as well as cast or sheet metal, can now be done automatically with the new Acromark No. 59 machine introduced by the Acromark Co., 365

Morrell St., Elizabeth 4, N. J. This machine is inclosed in a sheet metal cabinet measuring 24 by 36 by 60 in. except for the enamel applying rolls on top. A conveyor moves the parts to be enameled horizontally through the enameling position, then drops them by gravity down a chute where a regular plant conveyor or truck carries them away for drying.

Miniature fluorescent magnifier — Materials, finishes, and colors can be inspected or compared easily with a new miniature fluorescent magnifier introduced by Stocker and Yale, 48 Birch St., Marblehead, Mass. An



object can be seen in fine detail through the two-power lens mounted in the reflector between twin 5-in. fluorescent lamps. Since the point of observation is directly behind the light source, internal surfaces of holes and cavities can be seen with ease. The fixture is 6¼ in. long and weighs 10 ounces.

Low temperature radiation pyrometer — The Radiamatic, a low temperature radiation pyrometer for use where the measuring device does not or cannot come into contact with materials or processing equipment, has been developed by The Brown Instrument Co., div. of Minneapolis-Honeywell Regulator Co., 4494 Wayne Ave., Philadelphia 44, Pa. According to the company, tests conducted in rubber and plastic mills, in continuous curing ovens and paint pigment kilns show that low temperature radiation control reduces rejects, speeds output, assures uniform quality, and reduces power losses.

Roll coating machine — A new roll coating machine with a standard drive speed of 75 lineal ft. per min., 10-in. coating rolls, and 8-in. doctor rolls is being offered by Columbia Machinery and Engineering Corp., Hamilton, Ohio. The large coating rolls are said to reduce the angle of departure from the work, providing a more uniform spread; the larger crotch affords greater capacity and closer control of coating material spread. These coating rolls have a corrugated rubber surface with circumferential grooves, 0.025 in. deep, spaced 20 to the inch. Tables, troughs, and rolls are easily removed for cleaning. The in-feed table is solid; the off-bearing table has a number of adjustable pick-off fingers of new design.

Hand and foot controlled valves—The Airmatic Valve, Inc., 1643 E. 40th St., Cleveland, Ohio, has developed two non-corrosive hand and foot controlled valves—Model HF-3, a three-way valve, and Model HF-4, a four-way valve. They are available in ¼-in. size, and are recommended for the positive, accurate control of small single acting and double acting cylinders on continuous operated machines.

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery

"British International Plastics Annual 1947", edited by Lionel G. Hill.

Published by Croome Hill International Ltd., 100 Victoria St., London, S.W.1, England. Price 63/—, 459 pages.

The editor of this very creditable annual has requested that this review be on as critical a note as possible. He observes that bouquets, though pleasant, hardly rank as sound building material. We are glad to oblige because we have certain opinions on the subject of this type of publication which can now be aired.

First, let us indicate the contents of the annual as a basis for the discussion to follow. The Technical Section consists of a short introduction to plastics (7 pages), discussions of the chemistry of synthetic plastics (114 pages) and the significance of commonly measured properties (60 pages), a review of fabrication processes (70 pages), and a survey of miscellaneous applications (14 pages). The Directory Section (176 pages) covers properties of commercial plastics, solvents and plasticizers, sources of plant and machinery, molders marks, societies and trade associations, manufacturers' agents, educational facilities, and trade names.

The introduction starts as follows: "There are already a considerable number of books and reference journals on plastics; why, then, should we be producing another?" The editor's answer is that this book is not for the production and chemical engineers nor for the "man in the street," but rather for the user "to whom the complex formulae of chemical synthesis are meaningless" and whose need is essentially confined to the technical data on the grades of materials available commercially and to information on sources of materials, machinery, and technical assistance. Just why the next hundred pages or so are given over to the hieroglyphics of the chemist is not clear. Could it be that a true understanding of the properties of these products of the chemical industry requires at least a rudimentary appreciation of the nature of the alloying elements?

Any publisher who compiles a directory of the industry attempts to furnish the user of plastics with technical data and sources of supply. Whether this book performs this function as well or better than other available publications is a moot point on which for obvious reasons we are biased. However, the contents of its Directory Section, as listed above, indicate that this book can hardly be said to be unique in this field.

The editor makes a special point of supplying for the first time detailed information on the properties of some of the thousands of commercial grades of plastics, tabulated under proprietary names and designations. Aside from the fact that this sort of information was featured in a now obsolete handbook of plastics some years ago in the United States, this practice constitutes retrogression in so far as technical thinking in this country goes. The American Society for Testing Materials, the Society of Automotive Engineers, the Society of Plastics Engineers, and the Society of the Plastics Industry, as well as various Government agencies, are striving to simplify the problem of the selection of plastic materials by the user rather than to have him confronted with a bewildering and confusing array of thousands of names and numbers.

The information in the Technical Section of the book, while written in an interest-focussing narrative style, certainly is not presented in print for the first time. Although the editor disclaims any attempt to cover matters of taste or fashion, the complete absence of illustrations of the applications of plastics (except for those in three advertisements) seems a shortcoming in any book on the subject. It appears to us that to serve adequately the requirements of the user of plastics, an annual publication of this type must combine coverage of the application possibilities and problems with conveniently organized technical data on the materials and processes.

This review would not be complete without some comment on the new term coined and used by the editor to embrace the modern plastic materials,—namely, "Plasthetics" derived from PLAStics and synTHETIC. One only needs to examine the wording on containers and tags of merchandise made of plastic materials in this country to become convinced that the word "plastic" is here to stay. An industry producing a billion pounds of material annually is not apt to quibble over a name at this late date, any more than the "rubber" industry will change to a name pertinent to tires rather than to rubbing out pencil marks. The words of Dr. Baekeland written in 1909 are still of great significance: "For all plastics like rubber, Celluloid, resins, etc., the molding problem is a very important one. Several substances which otherwise might be very valuable are useless now because they can not economically be molded . . . And that is the main difference between a *plastic* and a *non-plastic.*"—*G.M.K.*

"American Wool Handbook," by Werner Von Bergen and Herbert R. Mauersberger.

Published by the Textile Book Publishers, Inc., 303 Fifth Ave., New York 16, N. Y. Price $8.00. 1150 pages.

This is a second and enlarged edition of a reference book on all technical phases of wool growing, marketing, grading, and the latest mass production techniques of the woolen and worsted industry. Its 25 chapters cover sheep raising, physical and chemical properties of wool, spinning, weaving, wet and dry finishing, and testing. Wool tariff schedules and labeling rules are included. The book has been brought thoroughly up-to-date, particularly as to machinery and continuous processing.

Report on German technology—The first of a new series of comprehensive BIOS over-all reports on German technology is now being made available to American businessmen. The first report, a critical evaluation of the German petroleum and synthetic oil industry, was prepared by a mission from the British Ministry of Fuel and Power. It is based upon information obtained by American and British industrial intelligence specialists who investigated German petroleum and synthetic oil processes. Copies of BIOS Overall Report No. 1, "Re-

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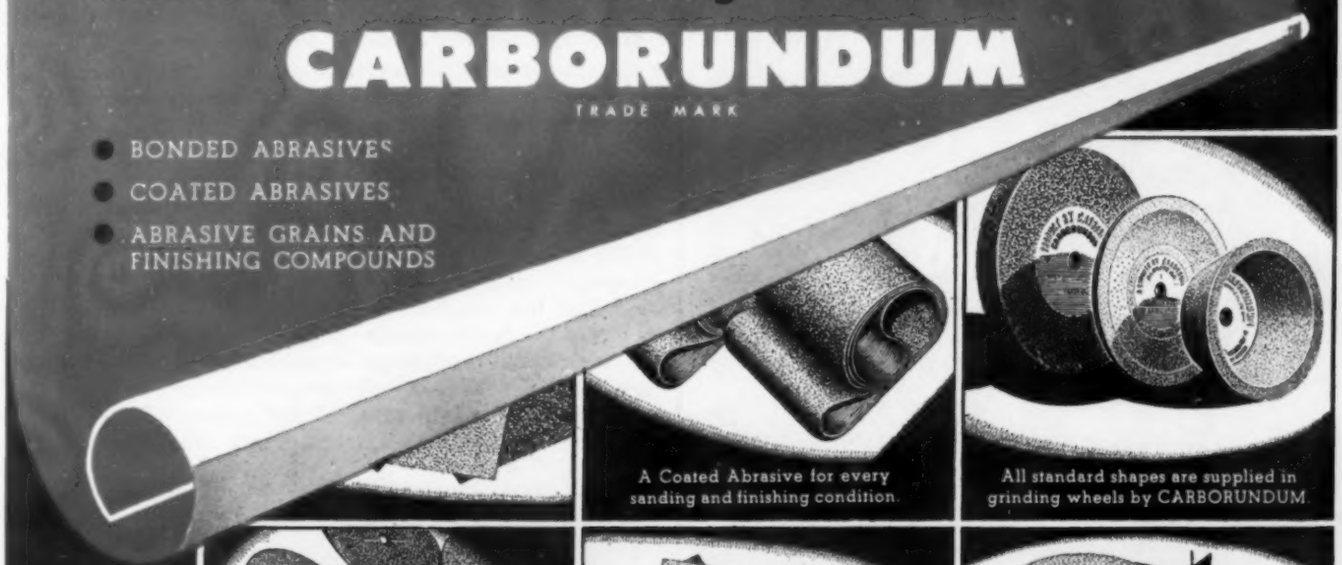

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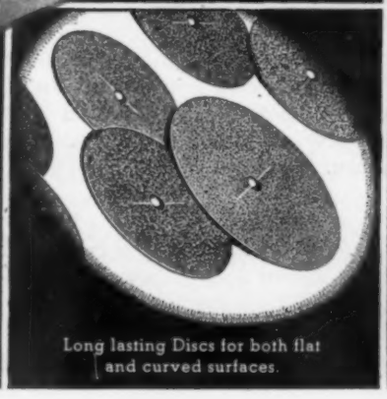

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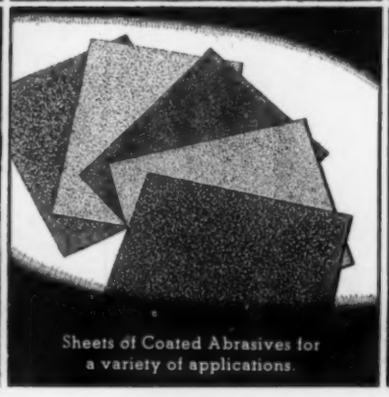
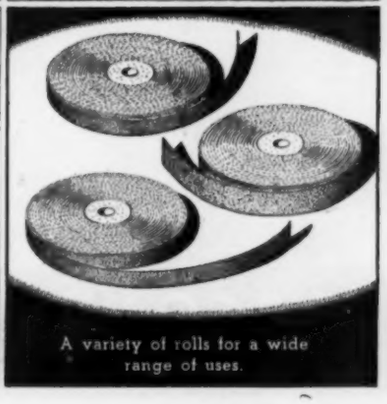


Sheets of Coated Abrasives for a variety of applications.



A variety of rolls for a wide range of uses.

port on the Petroleum and Synthetic Oil Industry of Germany," are available from the British Information Services, 30 Rockefeller Plaza, New York, N. Y., at $3.

Chromium plating—A revised 36-page catalogue designed to provide helpful information for application of industrial chromium plating has been issued by the Chromium Corp. of America, 120 Broadway, New York 5, N. Y. The publication outlines the accomplishments of chromium plating under operating conditions. A description of the characteristics of chromium plating is given, complete with tables and charts. Research facilities and technical advice are offered by the corporation in solving specific problems of wear and corrosion.

Saw, tool, and file manual—A 64-page booklet, "How to Choose and Use Tools," published by Henry Disston & Sons, Inc., Tacony, Philadelphia 35, Pa., describes the history of tools, tells the history of the company, and gives a complete description of the various tools which it manufactures.

Carbon black chart—The Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., has released a new carbon black chart, covering competitive grades of rubber blacks and color blacks.

Corrosive fluids—A four-page bulletin, No. 97, giving detailed recommendations on construction materials for almost 400 different corrosive liquids and gases has recently been published by Fischer & Porter Co., Dept. 9G-L, Hatboro, Pa. The bulletin was designed specifically for selecting materials to be used in the company's Flowrator instruments for measuring flow of corrosive fluids.

Pilot plants—An eight-page booklet, entitled "On Pilot Plants and the Synthesizing Process Pilot Plant," describing the function and importance of pilot plants in the chemical-process industries, and the operation of the Patterson Synthesizing Process Pilot Plant, has been published by the Patterson Foundry & Machine Co., East Liverpool, Ohio.

Synthetic rubber rings—The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio, has released a 12-page booklet, No. 901, describing synthetic rubber O-Rings for aircraft and industrial use. Introductory pages of the booklet cover the general aspects of O-Ring sealing, with application information. Dimension and selection tables cover 88 ring sizes, and list gland, cylinder bore, piston groove, and piston rod diameters for each size. Information on service characteristics is also included.

Fire extinguishers—Charts showing the characteristics of approved hand fire extinguishers on flammable liquid fires are features of a 20-page booklet issued by the Ansul Chemical Co., Marinette, Wis. Included in the booklet is a pictorial explanation of the action that takes place when Ansul dry chemical comes in contact with flames.

Data on resins—Bakelite Corp., 30 E. 42nd St., New York 17, N. Y., has released a colorful 38-page booklet entitled "Vinylite Resins and Plastics." This informative booklet, which has been prepared in response to requests for a compact and up-to-the-minute picture of the company's products, is intended as a concise guide to the forms, properties, and uses of Vinylite

resins and plastics. It also shows how they can be utilized to assure plastic products of attractive appearance and long-lasting service.

Data on plastics—"Plastics Catalog Fabrication Manual," a 65-page catalog, has been prepared by Berton Plastics, Inc., 19-27 W. 21st St., New York 10, N. Y. The catalog in its entirety covers commercial production of plastics, design possibilities, fabrication operations, materials and equipment, accessories and tools, and reviews of a number of books concerning the plastics industry. The catalog is supplemented with many diagrams and illustrations. It may be obtained for 25¢ per copy by writing to the company.

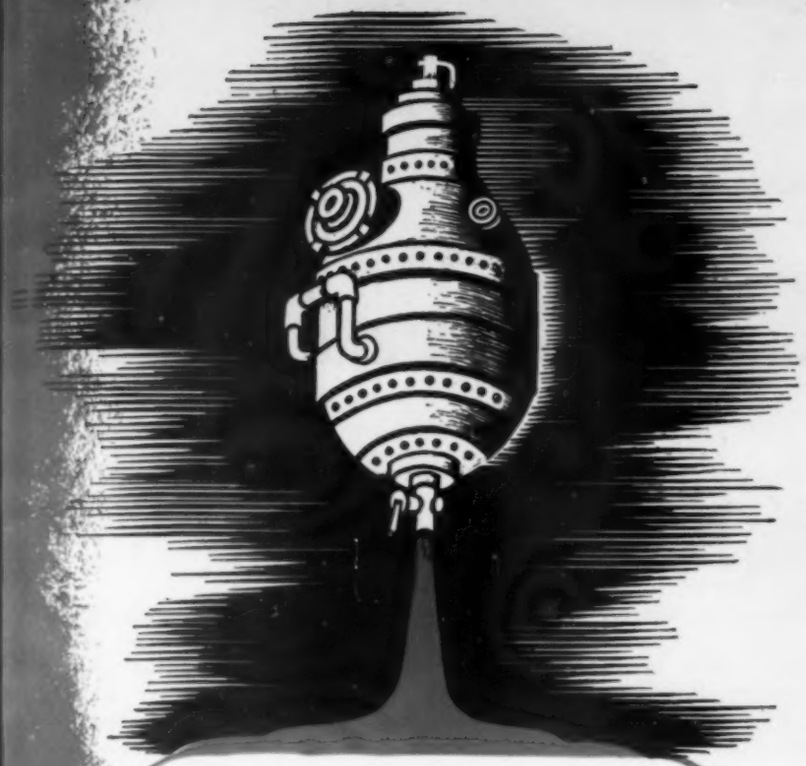
Decalcomanias—The nature and quality advantages of decals and service sales help, plus 23 profitable ways for decals to be used in industrial applications, are included in a 10-page booklet entitled "What Decals Can Do For You." The booklet, released by the Palm Brothers Decalcomania Co., Cincinnati 12, Ohio, illustrates a variety of industrial decal applications from tiny nameplates to large truck panels, and contains a number of actual decal samples.

Hydraulic presses—The Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H., has just issued two booklets concerning its hydraulic presses. Bulletin No. 112 explains the operation and gives specifications on the Greenerd four, six, and eight ton presses. Catalog No. 40 gives complete information on methods of operation, plus specifications on hydraulic and hand operated arbor presses. This 20-page catalog is supplemented with illustrations of each press.

Industrial uses of glass fiber and nylon fabrics—A technical bulletin giving extensive facts about many Fiberglas and nylon fabrics for industrial uses has been issued by the Industrial Div., The Duplan Corp., 512 Seventh Ave., New York, N. Y. Included in the bulletin are tables which show thickness, weight, breaking strength, width, construction, and other facts regarding a large number of standard weaves of Fiberglas and nylon fabrics. Industrial applications of these fabrics are illustrated and described; details of their properties are presented.

Infra-red applications—"Modern Baking, Drying, Heating with Industrial Infra-red Lamps," a 16-page booklet, has been announced by Advertising and Sales, Westinghouse Lamp Div., Westinghouse Electric Corp., Bloomfield, N. J. The booklet describes radiant heat processing for metal-working, plastics, textile, leather, graphic arts, paper, food, woodworking, building, glass and bottling, rubber, and other industries. Case histories are presented to show how infra-red cuts costs, speeds production, and saves space wherever heat is required for dehydrating, finish baking, or mass heating. A check list of applications for which it is now being used is included in the booklet, plus application data to aid in planning installations.

Materials handling conference—Publication of "Some Basic Techniques in Materials Handling," a report of the proceedings at technical sessions of the Conference on Material Handling, held recently in Cleveland, has been announced by the management of the National Materials Handling Exposition. The 84-page book contains 19 papers by leading speakers at the Conference. The book may be obtained for $1 from Clapp & Poliak, 350 Fifth Ave., New York 1, N. Y.



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PLASTICS STOCK MOLDS*

JULY 1948

A—Tailored boudoir lamp shade, 8-in. diameter, 6 in. high. Furnished complete with clips. Polystyrene. Ivory, pink, blue, lime, or orchid.

B—Boudoir lamp shade, 7-in. diameter, 6 in. high. Furnished with clips. Polystyrene. Ivory, blue, lime, or orchid.

C—Candle lamp shade, 4½-in. diameter, 4 in. high. Furnished with clips. Polystyrene. Ivory, pink, blue, lime or orchid.

A to C inclusive manufactured by Rogers Plastic Corp., P. O. Box 409, Springfield, Mass.

*Reg. U. S. Patent Office.

D—Bath brush, 13-in. handle, weight 6 oz. Furnished with or without the nine rows of nylon bristles. Acetate, acrylic, or other thermoplastic materials. Assorted colors.

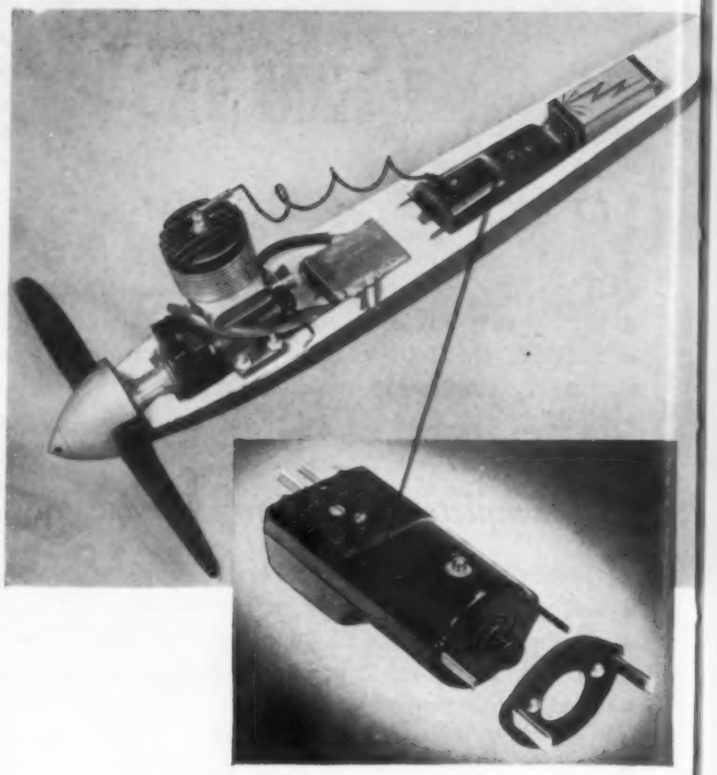
E—Ladies' half roller brush, 8 in. long, weight approximately 2 oz. Can be furnished with or without eight rows of nylon bristles. Acrylic or acetate. Molded in a three-cavity mold. Assorted colors.

F and G—Five row flare ladies' brush, 8 in. long, weight 2 ounces. Backs come in two styles furnished with or without bristles. Cast phenolic. Assorted colors.

D to G inclusive manufactured by Amity Plastics Co., Inc., 502 W. 45th St., New York 19, N. Y. N. Y.

H—Barrier type terminal strip, 8⅜ in. long, 2 in. wide, ¾ in. between 3/16 in. mounting centers. Inserts are brass burnished, nickel plated. Strips can be furnished with one to eight terminals. Phenolic. Ther Electric & Machine Works, 17 S. Jefferson St., Chicago 6, Ill.

I—Tablespoon and teaspoon measure, approximately 3 in. long. Polystyrene. Molded in 12-cavity mold. Assorted colors. American Plastics Corp., 225 W. 34th St., New York 1, N. Y.



Complete ignition system for model airplane is contained in polystyrene housing, 1⅜ by 3¼ in., weighing one ounce

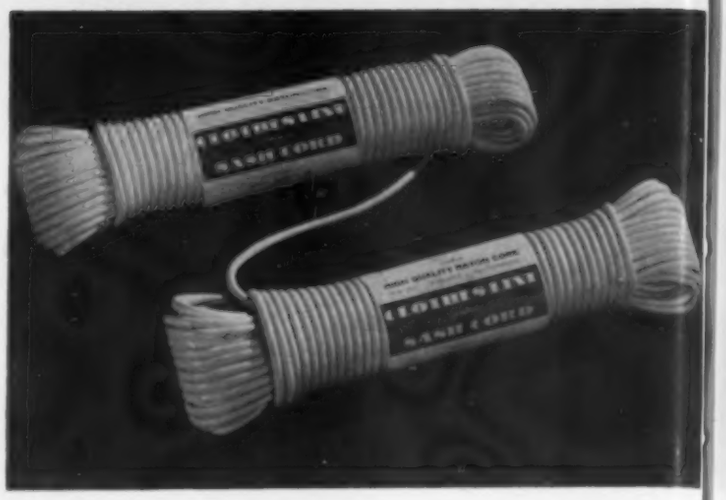
Ignition Unit For Model Engines

A complete ignition system for a model airplane, boat, or racing car is contained in the 1⅜ by 3¼ in. Balco Unit, molded of polystyrene. The unit, which weighs only one ounce, saves the model builder the time and trouble of assembling and wiring an ignition system, and provides him with an easily accessible, instantly interchangeable ignition which plugs in.

Plastic protects wiring

The unit is manufactured by Balco Products, Inc., Austin, Tex., using polystyrene parts molded by Nalle Plastics, Inc., Austin. The plastic housing protects the wiring and ignition parts from gasoline, oil, or moisture—the last of which is important in model boats.

The short length of the molded-in wiring is said to give the unit a hotter spark and to insure longer battery life. The complete wiring, the on-off switch, the battery plug, and the firewall plug are contained in the single unit, thus avoiding the possibility of bad contacts or faulty ignition connections.



Vinyl-rayon clothesline, 7/32 in. in diameter, is sold in hanks. The line is extruded at a rate of 175 ft. a minute

Clothesline

Has vinyl jacket over rayon core; is sold in hanks

WHAT is claimed to be one of the few plastic clotheslines sold in hanks is now being produced by Jessall Plastics, Inc., Hartford, Conn., under the trade name of Conncord, and sold through area distributors. The hank, as distinguished from a coil or reel, consists of four 50-ft. or two 100-ft. lengths, each of which is coiled and wrapped around the center but all attached to each other. Dealers are said to prefer them because they make for quick sales; it takes too much time to unwind a reel and measure the desired length for each customer when ready-measured hanks are available.

Troubles overcome

There have been many plastic clotheslines on the market, with varying success and considerable dealer indifference due to customer complaint. Much of the complaint was a result of the core construction. Some of the cores were jute, which deteriorates too quickly; some were paper without enough strength; wire core clotheslines frequently broke because of constant flexing, and were too stiff for tying.

The Jessall Conncord clothesline has a rayon core, which is low-cost and strong, and a vinyl jacket. In this combination company officials believe they have found the answer to a satisfactory plastics clothesline. It is 7/32 in. in diameter, including the vinyl jacket over the 3/16 in. rayon core. Only egg shell color is provided. The line is extruded at 175 ft. a minute.

Home Cup Dispenser

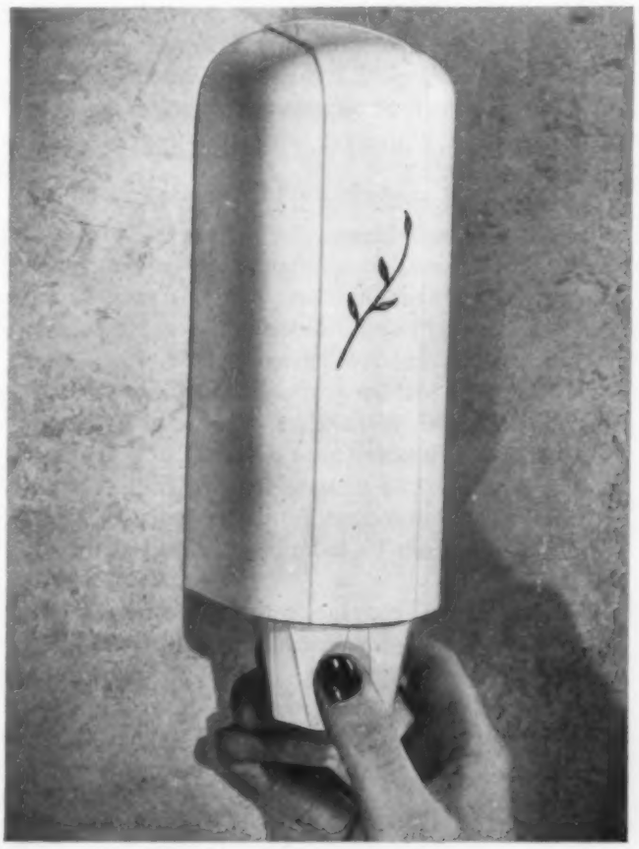
DISPENSERS for paper drink cups have long been used in offices and public places, but they have rarely been used in private homes. In the belief that there is a market for a dispenser which would really fit into the home, the Fred H. Lewis Co., Wilmette, Ill., has put one on the market which is specially designed for the purpose.

The Lakone Co., Aurora, Ill., molds the dispenser of white polystyrene. It measures 3 by 3 by 7¼ in. and is mounted on a wedge-type bracket which can be screwed or cemented to the wall.

The manufacturer is distributing the new dispenser through the usual channels for marketing housewares. Promotion is built around the sanitary angle, using arguments like "Replace that seldom-washed, used-by-all-the-family, bathroom glass with a clean cup for everyone, every time."

In addition, the product is being offered for sale as a premium item. Among those who are using it as a premium is the Lily-Tulip Cup Corp., New York, N. Y. When the dispenser is used as a premium, the buyer's design replaces the wipe-in design which is the trade mark of Lewis' Ivy Ware line of houseware items.

Polystyrene paper cup dispenser specifically designed for home use is sold directly to consumer or as premium item



Control panel shown regulates temperatures in four injection machines. Larger machines have two-point control

Production Temperature Control

IMPROVED regulation of injection molding temperatures has substantially increased production at the Modern Plastic Co., Los Angeles, Calif. Average machine efficiency has increased about 20 percent.

Output of the injection molding department averages about 30,000 lb. per month, and consists of door handles, refrigerator trays, cosmetic cases, etc., made of acetate, polystyrene, vinylidene chloride, etc. Five machines, of capacities ranging from 4 to 12 oz., have been equipped with the improved temperature controls.

Machine temperatures are detected by thermocouples at the usual locations in the plasticizing and nozzle zones. Small machines, with capacities of 4 or 6 oz., often need but one control zone. For the larger machines, two or more zones are used, with a separate temperature control system for each.

The temperature control used by Modern Plastic Co. was supplied by Leeds & Northrup Co., and is the duration-adjusting type (D.A.T.) of Micromax electric control. The unique feature of this control is that it regulates heat input by feeding electric power in impulses to balance the heat demand of the machine.

Its particular advantage to the molder is that once he sets the control point at the specified temperature, he needs to make no further adjustments, even though production rate, power line voltage, or other factors may change. The control system adjusts itself entirely automatically . . . varies the ratio of on-time to off-time exactly as needed to hold the machine at the desired temperature.

Wire-Gripping Plug

EASE of assembly at the factory and greater strength when assembled are the results of the unusual design of the Gripit attachment plug cap made by Huppert Mfg. Corp., Newark, N. J.

The plug consists of a compression molded phenolic main piece and two 1/16-in. thick solid brass blades. Channels to accommodate the blades and a hole for the electric wire are molded into the one-piece phenolic body of the plug. The hole in the cap to allow passage of the wire is 9/32 in. in diameter, so that the plug can be used with different gages of wire, including the types usually used for lamp and heater cords. Depressions molded into the outside of the plug body provide a nonslip grip when removing the plug from a socket.

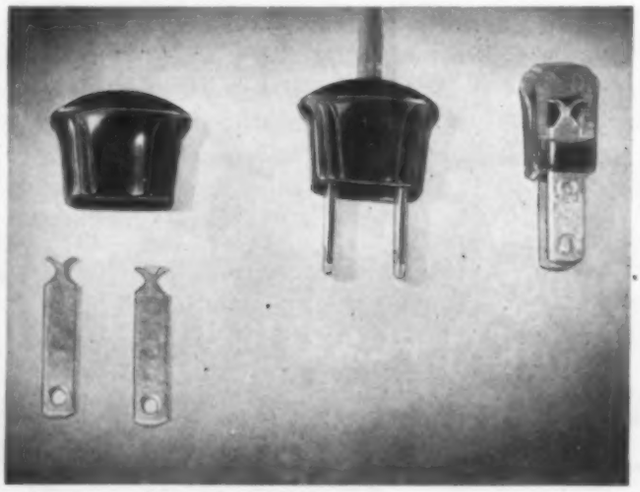
Withstands 45-lb. pull

Underwriters' Laboratory standards for such plugs require that each blade be able to withstand a 20-lb. pull without coming out. Each blade of the Gripit plug will withstand a 45-lb. pull. The extra strength results from the prong-like design of the blade and the manner in which it is assembled to the phenolic piece.

One end of each blade has two prongs which are separated at a 90° angle. In a specially designed machine and jig, the pronged end of each blade is placed over the stripped end of a wire and driven into the channel in the phenolic plug. When the prongs contact the end of the channel, they spread apart and the point of each prong bites into the phenolic.

This holds the blade firmly in place in the plug and keeps it in contact with the wire which is held firmly between the spread prongs and the phenolic body of the plug.

Unassembled phenolic plug body and blades (left). Complete plug (middle). Cutaway side view of the body (right)



Point of molded butt is pushed through material and nylon button is permanen ly snap-locked to it by finger pressure as shown in the upper left-hand corner of the photograph

Nylon "No-Sew" Buttons

THE old "bachelor button," which was much in evidence about 30 years ago, is coming back in a new and improved form—in plastics. The new two-part button, which can easily be snapped in place, is molded of nylon by Dulev Plastics Corp., Toronto, Ontario, for Sutton "Butt-On" Button Co., Toronto.

Thanks to the inherent qualities of the plastic material used, the Butt-On is a great improvement over its metal counterpart. The old bachelor button had a complicated locking mechanism, often rusted when washed, and was too ugly to be used for much of anything but work clothes or suspender buttons. The nylon version, on the other hand, is made of two simple parts which snap-lock because of the resiliency of the material. It will withstand laundering, strong soaps, cleaning solvents, the pressure of the rollers of a washing machine, and the heat of steam irons.

Molded in many colors

In appearance, the Butt-On is as attractive as any other solid-color plastic button. The manufacturer is planning to market a full range of sizes ranging from a shirt button to an overcoat button. At present, however, only a 30-ligne (¾-in. diameter) button is available. It is being molded in natural white (shown above), black, red, maroon, pink, orange, yellow, light green, navy blue, skipper blue, powder blue, brown, khaki, and grey nylon.

The Butt-On is being marketed in the replacement field through dry goods stores, chain stores, mail order houses, etc. It is packaged in boxes of four with cellophane windows to show the product. Detailed directions are printed in English on the outside of the box and in French on the inside—for French-Canadian buyers.

Phenolic selector switch dial on electric mixer has lettering molded in at an angle to avoid undercuts in mold

Angle Engraving

AN unusual method of molding-in lettering was used by Kurz-Kasch, Inc., Dayton, Ohio, in the production of a selector switch dial for an electric food mixer. The part was molded of phenolic for the Knapp-Monarch Co., St. Louis, Mo., manufacturer of a line of electrical appliances which includes the Mix-All electric mixer.

The specifications for the dial called for molded-in script lettering on the sharply tapered sides of the piece. A fast drying white paint was to be wiped on to fill in the lettering so that the identification of the various settings would stand out in contrast with the black part.

The problem was to find a way to mold the lettering deep enough to allow a neat filling job without causing undercuts which would prevent the tapered piece from being withdrawn from the mold.

The molder solved the problem by hobbing each of the eight cavities in the mold with a one-piece hob, and engraving the lettering by hand at an angle along the taper. The master was engraved by hand on air hardening steel and each cut was made at a 90° angle to the base of the master—rather than at right angles to the tapered surface on which the lettering is molded in. This made possible a straight draw from the mold.

The selector dial is molded in an 8-cavity semi-automatic steam heat compression mold. The material used is a general purpose black phenolic supplied by Bakelite or Durez.

British Plastics Exhibit

SIXTY EIGHT firms exhibited in the Plastics Section of the British Industries Fair, Earls Court, London, on May 3 to 14, 1948. The vinyl polymers in various new forms were prominently featured, the highlight being Tygan fabric woven by Fothergill and Harvey, Manchester, from the monofilament Bexan produced by B. X. Plastics Ltd. The fabric, which is light-fast, hard wearing, and resistant to water and acids, is recommended for general upholstery purposes; the monofilament is also being used for making mosquito netting for use in the tropics. B. X. Plastics Ltd., is also manufacturing a new type of floor covering called Tobex, for export only. Another interesting vinyl product shown for the first time was a flexible mold made from vinyl compounds by Vinyl Products Ltd.

Geon Ltd., showed injection molded P.V.C. (polyvinyl chloride) articles; a new type of extruded P.V.C., shown by Duratube and Wire Co. Ltd., is produced with lateral ribs and embossings in one process instead of by rolling after extrusion. C. C. Marshall Co. Ltd., displayed new decorative articles made from fabricated rigid and semi-rigid P.V.C.

Acrylic lens shown

Imperial Chemical Industries Ltd., featured several new developments, the most interesting being the Perspex acrylic lens designed for use in industries where assembly or examination of tiny mechanical parts has to be carried out. This aspheric lens is made by a new surface finishing technique perfected in the Research Laboratories of I.C.I.; it has a diameter of 5 in. and gives a flat, distortion-free field of vision and a magnification of two times.

Shown at the Fair for the first time was Alkathene brand polyethylene film now available for advanced testing in widths of 48 in. and thickness of 0.0001 inch. This film, which is substantially unoriented, has good transparency and appears to be of special interest as a drum liner for packing corrosive solid chemicals and for general use in the food industry.

Liquid resins were given prominence by both Catalin Ltd., and British Industrial Plastics Ltd., and the new core-binding urea resins created a good deal of interest. They are now being used in foundry work to replace linseed oil core binder. It is expected that the demand for these resins will be considerable once the steel industry accepts them for general use.

In the molding field the most unusual developments were the moldings produced by Ashdowns & Co. Ltd., which showed permanent two and three color effects made by introducing different colored powders into the mold rather than by actual printing or use of transfers.—*John S. Trevor.*

Left to right: President Truman; Charles A. Higgins; Mrs. Cochrane; and John D. Cochrane, winner of the award

Presentation of Hyatt Award

THE John Wesley Hyatt award for 1947 was presented to John D. Cochrane, Jr., by President Harry S. Truman in a ceremony at the White House on May 25, 1948. Mr. Cochrane, who is director of research and development of the Formica Insulation Co., Cincinnati, Ohio, was honored for his work in the development and continued improvement of commercially acceptable decorative laminates from condensation resins. For further details, see p. 115 of the June 1948 issue of MODERN PLASTICS.

The President presented the Hyatt gold medal and one thousand dollars in a ceremony attended by a small group including Charles A. Higgins, president of Hercules Powder Co., Wilmington, Del. This company sponsors the award each year in honor of John Wesley Hyatt, whose work with cellulose nitrate and camphor led to the development of Celluloid, the first thermoplastic, in 1867.

After the presentation Mr. Cochrane was guest of honor at a reception and banquet in the Anderson House, Washington, D. C. The toastmaster was Richard F. Bach, dean of education and extension, Metropolitan Museum of Art, New York, N. Y. Hon. Edwin C. Johnson, senior United States Senator from Colorado, delivered the main address of the evening.

ARE YOU LOOKING FOR

. . . a discontented molder?

You are if you want to speed the day when your plastic product is improved.

We are discontented with everything we make for every customer we have. We know that some day—maybe next week, next year or ten years from now—somehow, *somebody* will find a way to make those products better. We gain, as well as our customers, if that "somebody" is *us*.

So, whether our customers ask us to or not, we can't stop ourselves from constantly seeking ways to apply new materials and molding techniques to everything we make.

For instance, as a result of our discontentment, meter manufacturers now have a better meter disc. Not only were our engineers able to apply a recently developed material which had greater heat resistance, but they improved the molding method and made a stronger, tougher disc with increased dimensional stability. But we're not content with that. Some day we hope to make them better.

It may pay us both to get together

Starting with hard rubber over 60 years ago, our molding experiences now cover a wide range of natural and synthetic rubbers, thermo-setting and thermo-plastic materials, including new plastics such as Plexene M, Nylon and Lustrex.

With such a wide interest in plastics, we are always in a good position to advise on the best material for your product and to suggest a change when a better material comes along.

If you are planning or using large quantities of a molded product, not only can we turn out the best that can be made today . . . we can improve your chances for a better product tomorrow.

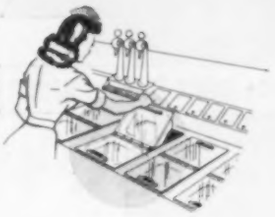
VULCANIZED RUBBER AND PLASTICS COMPANY

Manufacturers of Rubber and Molders of Plastics

4 E. 29th Street, New York 16, N. Y.

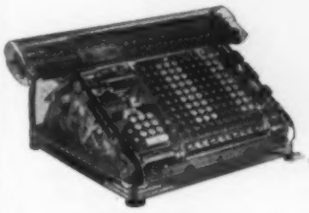
K PLASTIX

"Serving the needs of INDUSTRY where PLASTICS do a better job"



SPEEDS UP FOUNTAIN SERVICE!

A real break for soda fountains everywhere! This new K-Plastix transparent, non-fogging ice cream dispenser lid makes it easy to see flavors, easy to clean!



A REAL SALES BUILDER!

This crystal-clear K-Plastix case enables prospective customers to see the fascinating, intricate working of world-famous Friden fully automatic Calculator demonstration models.

HELPS PASS THE SALT!

Streamlined, shatterproof, sanitary plastic parts for this salter — which meters salt into canned food up to 300 cans per minute— are made by K-Plastix for Salter Machine Co., Oakland. Non-toxic, non-corrosive, easily cleaned, transparent plastic permits constant checking of mechanism.

See these and other examples of industrial plastic applications at the K-Plastix exhibit — Bay Area Industrial Exposition, starting July 2, 1948, at Civic Auditorium, San Francisco.

A few territories open — to well established firms only.

ENGINEERS FABRICATORS

K PLASTIX

580 Natoma Street
San Francisco 3, Calif.
UNderhill 1-4575

S.P.I. Conference

(*Continued from page 86*)

know what they are buying. All plastics products should be informatively labelled, to increase consumer confidence.

MERCHANDISING MOLDED PLASTICS

by Charles W. Worley, president, B. W. Photo Utilities Corp.

GOOD proprietary plastics producers do not like to reduce quality in order to reduce price. And since higher labor and material costs make price reduction difficult today, their only salvation lies in merchandising. Merchandising, in turn, is a composite of featuring quality of product, attractive packaging and display, and proper pricing.

There is far too much copying, at lower price and low quality, of good items in plastics. The successful house will originate products and will invariably select the best material for the application.

A MAIL ORDER HOUSE SURVEYS THE PLASTICS INDUSTRY

by M. L. Poust, Sears Roebuck Co.

SEARS' engineers are constantly trying to get better products cheaper. They therefore are interested in molding plant and fabricating plant economics—in the amount of rejects, cost of molds, speed of production, and in finishing and inspection by their molders. They concentrate on specification buying, on the integration of their molders' production pacing with that of manufacturers of other components. They believe there is too much difference between quotations coming from different molding plants.

THE ADVANTAGES TO INDUSTRY OF INFORMATIVE LABELLING

by Harold W. Brightman, president, Lit Bros.

THE whole program of better buymanship revolves around the fact that satisfied customers don't return goods. This means that sales people must be better informed by instruction, particularly on new materials such as plastics; the consumer must be better informed through informative labelling and advertising. Common basic tests should be a factor in an informative labelling program and a common language should be used in referring to these tests.

FINANCIAL AND TRAFFIC MEETING

Chairman, E. H. Gabel, accountant, General Electric Co.

HOW MUCH CAN WE AFFORD TO SPEND FOR NEW EQUIPMENT?

by E. H. Gabel, General Electric Co.

MANY companies have gone bankrupt through over-expansion; many others have failed to make satisfactory progress because they hesitated to scrap the obsolete in favor of improved equipment and new methods.

If expansion and improvements are planned wisely and thoroughly, sales should be increased at reduced costs, employees should benefit by improved working conditions and continued high wages, the stockholders should earn reasonable profits, and the public should benefit through lower prices.

PROTECTION THROUGH PROPER COST ESTIMATING

by Edward Waygren, MacDonald Brothers, Inc.

A MOLDER must know all the factors which go into his costs on any particular job: material, handling material,

handling inserts, direct labor, overhead, inspection, packing, mold shop costs, etc.

The traditional method of pricing is to total all the costs and add a percentage for profit. This involves charging a profit on the material, which may amount to 50% of the cost on some jobs. Other molders accept the proposition that they are entitled to a fair profit on the value they add to the product, not on the material costs. Other things being equal, in a competitive market such molders will get the jobs.

RECENT TRENDS IN TRANSPORTATION RATES AFFECTING PLASTICS

by Barney A. Butryman, Colt's Mfg. Co.

INCREASES granted to the carriers to offset increased labor charges are of an inflationary nature and can not be avoided. But the plastics industry must watch proposed changes in rating which, in effect, assess a double increase on plastics shipments. It is also important to watch descriptions on shipments, being certain to use descriptions which properly describe the contents and not general descriptions like "plastic items" which do not appear in transportation classifications or tariffs. Such vague labels leave the assessment of a rate up to clerks who cannot be expected to know the proper rate from the meager description given.

TODAY'S HIGH BREAK-EVEN POINT

by Ernest J. Johnson, Certified Public Accountant

PERHAPS one of the most disturbing factors facing the business man today is the relatively high break-even point he encounters. In many cases, the break-even point is now higher than the normal pre-war annual volume of sales. The sales must be increased or costs must be decreased if such businesses are not to lose money when sales go back to normal.

Every type of expenditure should be scrutinized to see whether it can be reduced or whether the company can secure more benefit from the expenditure. Material costs, losses because of handling or rejects, the advisability of a wage incentive system, plant layout, the installation of more efficient equipment, factory overhead, and selling and administrative expenses should all be studied.

THE IMPORTANCE OF CONSERVING WORKING CAPITAL TODAY

by Samuel Booth, Bryant Electric Co.

WORKING capital is simply defined as the excess of current assets over current liabilities. Current assets include cash, investments in short term securities, accounts receivable, notes receivable, and inventories. The last is probably the greatest pitfall of all. It is important not to buy for, or maintain inventories, beyond the reasonable need of the business. All items in inventory should be readily convertible into the products which the business is selling, and thereby convertible into cash.

LABOR MEETING

Chairman, Sidney I. Howell,
Mack Molding Co.

THE SALESMAN'S PAY CHECK—WITH ACCENT ON INCENTIVE

by G. C. Denebrink, Bigelow-Sanford Carpet Co., Inc.

THERE are six basic requirements of a sound sales compensation plan: 1) it must provide some security of income for the salesman; 2) it must provide the salesman with a strong and positive incentive for plus selling effort; 3) it must provide for equitable compensations as between salesmen; 4) it must provide management with an effective control over sales expenses in relation to volume; 5) it must

provide management with an effective method for the direction of sales effort; 6) it must produce sales volume at an economic sales cost.

These principles were illustrated by describing the new plan in force in the Bigelow-Sanford Carpet Co., Inc.

DEVELOPMENTS IN LABOR RELATIONS

by L. W. Babcock, Hercules Powder Co.

THE most conspicuous development in labor relations during the past 15 years has been the growth of the labor union movement.

A second development within recent years has been an active interest in the adequacy, fairness, and orderly control of salaries and wages.

Third, there has been a very definite interest in the determination of the attitude of the worker—a desire to learn what is on the worker's mind, what he wants, how he evaluates the company and its treatment of him as an employe.

Also, there has dawned upon industrial leadership the realization that immediate supervision—the foreman and direct supervisor—is a part of management and that on this group rests the fate of any labor relations program.

EXTRUDERS MEETING

Chairman, C. N. Sprankle
Sandee Mfg. Co.

LIQUID TRANSMISSION THROUGH EXTRUDED POLYETHYLENE FILM

by J. H. Parliman, Plax Corp.

A SIMPLE test for determining the rate of transfer of liquids through polyethylene film has been developed and used. Little laboratory technique and a minimum of apparatus are necessary. Permeability tests were run on 48 different liquids, and an empirical method of predicting approximate transmission rates of liquids containing only hydrogen, oxygen, and carbon was found.

EFFECT OF SCREW DESIGN ON THE DRY EXTRUSION OF CELLULOSICS

by W. P. Moeller and R. Phillips, Central Research Laboratories, Celanese Corp. of America

IT has been shown that each screw has optimum temperature conditions, and that the performance of a machine is affected by the temperature of the screw, die, cylinder, and feed. When optimum temperatures are maintained, the dimensions can be held better and the over-all production appreciably improved. It has also been shown that optimum cylinder clearance is required to obtain freedom from surging and that excessive clearances reduce the production rate.

COMPRESSION MOLDERS MEETING

Chairman, John J. Bachner,
Chicago Molded Products Corp.

COMPENSATING THE SALESMAN OF MOLDED PRODUCTS

by W. F. Reibold, The Waterbury Cos., Inc.

A STRAIGHT commission basis works out very satisfactorily where a company is well established in a territory, but there are many territories where the business would not support a salesman with a plastic line only. For such type of selling, a rate of 5 to 10% is usually paid. This is on parts only and molds should be excluded. If the rate is on net sales, the cash discounts, allowances made to customers, and returned goods must be deducted before the commission is computed.

The most equitable means of compensation from a salesman's point and the cheapest sales expense from a company point where it runs into any volume is salary plus a bonus above an attainable quota.

FUTURE TRENDS IN MATERIALS SUPPLY

by Frank H. Carman, Plastics Materials Manufacturers Association.

EXPANSION plans of the material manufacturers are now substantially completed to the point that production levels at a rate of 12% above the 1947 total are being maintained. This production is practically meeting all requirements and in all probability these levels can be increased in 1948.

Additional facilities for manufacture of methanol and formaldehyde have or will shortly do away with any shortages for these basic chemicals. New facilities for the manufacture of urea will come into production in the last half of the year at which time it is expected full production of amino molding materials will be possible. Phenol production in 1948 is already operating at a rate somewhat above the 1947 average and a limited increase in production will be made in the third quarter. However, no substantial increase in phenol is believed possible or probable before 1950.

FABRICATORS MEETING

Chairman, Arthur deAngelis,
industrial designer

INDUSTRIAL DESIGNER'S VIEWPOINT OF FABRICATING POTENTIALS

by Henry F. Pearson, Pearson-Berlinghof, Inc.

A LARGE proportion of fabrication is for display, merchandising, and advertising. The requirements of this field not only permit plastics to do what only they can do, but encourage the use of everything new and strange. This is a marvelous entrée into the public's acceptance of real plastic potentials. The constant demand for novelty and striking effects in this field will do much to develop plastics and fabrication processes.

MARKETING POTENTIALS IN THE FABRICATION FIELD

by Hiram McCann, associate publisher, MODERN PLASTICS Magazine

THERE is a good market in television enlarging lenses, since about 36,000 television sets are turned out each month. But the cream has been taken off this business and only a fabricator efficient enough to work on narrow margins can handle it. Demonstrator units of transparent plastics represent good business today, but, again, the margins are narrow, and the fabricator must have a big and well equipped shop to handle this business. Architectural applications are slowly developing; they will be worthwhile when the fabricators have settled on stock unit items which can be put up by workmen accustomed to using other materials and with standard tools.

The fabricator of cast phenolics has markets which are subject to pressures over which he has no control. Jewelry swings from plastics to metal and the market is lost; radio cabinets swing from fabricated jobs to molded and another market is cut. But any cast phenolic fabricator who is prepared to develop versatility, who is prepared to go after housings, cutlery handles, clocks, and the sign business can keep busy and can discount the cycles in his markets.

LIGHTING FIXTURES FROM ACRYLIC SHEET

by F. W. Tetzlaff, Rohm & Haas Co.

THE most important deterrent to large volume increased sales in this field has been the price factor. However, as

less expensive materials are found wanting in specific requirements, the acrylics will find even more general use than at present.

Probably the most widespread use has been in railway car lighting. Another use has been in the sign tracks of super markets and food chains. To reduce high maintenance costs caused by vandalism, municipalities and maintenance companies have used substantial amounts of acrylic for street lighting purposes.

INJECTION MOLDERS MEETING

Chairman, Edward Singer,
Victory Mfg. Co.

DEVELOPMENTS OF LOWER COST INJECTION MOLDS

by H. C. Spaulding, The Electric Auto-Lite Co.

MANY different ideas have been discovered which permit procurement of an injection mold in the least possible time with the least cost. Among the outstanding ideas for cavities with intricate designs are pressure castings of beryllium copper and stainless steel peripheral casting. Another method is the use of semi-hard steel plates and with cavities machined directly in them. Shortcomings of the stainless steel cavities are due to the fact that the cast parts are somewhat too rough. With beryllium copper, large flat areas for molding transparent plastics seem to result in small flow lines which will not polish out.

RECENT ADVANCES IN THE ART OF INJECTION MOLDING LARGE PIECES

by George W. Whitehead, Improved Paper Machinery Corp.

IN order to produce a so-called large piece, a machine must be equipped with ample mold space and clamping tonnage, sufficient plasticizing capacity, and the required injection pressure and controls. The proper selection and use of a material for the application is of prime importance, and the design and building of the mold to fit the machine that it is going to run in is a definite requirement. After the mold has been set up in the machine, the operation of the machine, the mold, and the material in a manner capable of producing a piece satisfactorily is a prerequisite to good molded parts. Of almost equal importance is the manner of handling the molded part after it has been removed from the mold.

THE OFTEN SLIGHTED FACTOR OF CLOSE DIE TEMPERATURE CONTROL IN QUALITY INJECTION MOLDING

by D. L. Davenport, Meridian Plastics, Inc.

IN the injection molding process, there are four variables; namely, temperature, time, pressure, and molding material. If any one of these is unknown or uncontrolled, scientific operation is not possible.

Injection machines today are designed with equipment with which pressures, both clamping and injection, as well as heating chamber temperatures, can be accurately controlled. The thermoplastic molding material suppliers furnish information on required pressures, flow temperatures, and other data, but seldom do they stress mold temperatures. Once the optimum molding condition has been determined, it is important that the quality molder keep these conditions constant and be able to duplicate these conditions on subsequent runs.

THE DEVELOPMENT OF A SPECIFICATION FOR POLYSTYRENE WALL TILE

by C. J. Poiesz, United States Department of Commerce

THE commercial standard for polystyrene wall tiles in its present proposed state contemplates the following basic

provisions: It will identify the material from which the tile is molded as conforming to ASTM Specification D703-44T Type 1. It will establish the qualities which the molding process should produce. It will state a minimum thickness and will specify the desired degree of opacity. An accelerated test for determining color fastness is under consideration. Detailed requirements for the adhesive will be covered and test procedures given. Proper installation and maintenance will be covered in an appendix. After satisfactory circulation of these proposals among the interested parties and after being convinced that the program is well received, a commercial standard will be promulgated and announced effective as of a specified date.

PLASTICS FILM, SHEETING, AND COATED FABRICS DIV. MEETING

MORE accurate testing methods and how to make use of them are the goals of this comparatively new but unusually active S.P.I. committee under the chairmanship of Frank J. Groten of Firestone Rubber Co. This tremendously growing branch of the industry is plagued with a great variety of test methods—many of which were devised for other materials and few of which have been standardized.

Ten sub-committees have been formed to arrive at a set of standard tests as rapidly as possible. At the same time, minimum standards are to be set lest later developments outmode them.

The sub-committee on flexing, abrasion, and tear strength has made good progress—especially for tear strength testing, with the help of the Bureau of Standards—but no one is yet ready to recommend standard procedures that will give uniform results.

The group working on flammability tests is pressed for time due to the state and national legislative action that is under consideration, but it is not satisfied with the currently known tests for determining relative hazards. A model testing machine to determine ease of ignition, rate and intensity of burning, and ease of extinguishing the flame, built to the committee's recommendation, is under construction.

The toxicity, odor, and insect infestation of film are generally dependent upon the plasticizers used. The fields are so broad and complicated that a tremendous amount of work is yet to be done. Toxicity, for example, covers skin irritation, effects of perspiration, and many other factors. Odor testing by the human nose is definitely unsatisfactory. The entire testing field is handicapped by all sorts of miscellaneous problems never before encountered. No methods have ever been widely developed for testing for such things as mildew resistance and surface slipping. In testing seam strength, the committee now believes that investigation of shrinkage may be more vital than the study of heat sealing, on which they have concentrated up to now.

All sub-committee chairmen requested aid from members of the S.P.I. on any material or experience available that would help their committee members in establishing uniform standards for measuring plastic film properties.

Optical Lens Coatings

(*Continued from page* 126)

The concentrations of the various lacquers differed widely. To cite a few:

3.5% for Norton resins; a lacquer of higher concentration has a tendency to gel.

9.35% for cellulose nitrate and 13% for Vinylite VYDR were found useful.

20.5% for ethyl cellulose (N-7); a 23% lacquer

was prepared, but it filtered with difficulty and did not spin well.

62.3% for silicone (Dow Corning No. 2103).

100% for both CR-39 and diallyl phthalate.

Although generally its adhesion to glass is poor and its mar resistance low, a lacquer made from a thermoplastic resin usually compensates for these shortcomings by great ease of spinning and formation of coatings having good optical qualities. Lacquers made from thermosetting monomers (or pre-polymers), however, have better adhesion to glass and show a better mar resistance. Frequently, the thermosetting lacquers are more sensitive and therefore require greater care in spinning and in the elimination of dust and lint.

The lacquer itself is easily kept free from these impurities by observing the proper precautions in its preparation, storing, and handling. It is prepared by dissolving the resin or monomer in the calculated amount of solvent in a 1-liter round-bottom flask provided with a mechanical stirrer. Solution at room temperature[15] may take between 3 hr. and 3 days. If solution cannot be effected by this means, other methods[12] should be used; or a different solvent might be the answer. After solution is complete, the round-bottom flask is suspended upside down so that its mouth is inside and below the rim of a 600 ml. fritted glass filter funnel[16] (porosity C) attached to a 1-liter suction flask[16] with a stopcock in its side-arm. As soon as the filter funnel has filled with lacquer, the flask is evacuated; then the stopcock is closed and filtration proceeds, without attention, usually overnight. The lacquer is transferred to a dust-free stock bottle which is stored unstoppered in a desiccator or under an air-tight bell jar[17].

The lacquer is poured from the stock bottle into a 50 ml. hypodermic syringe, the tip of which is closed with a cap[18]. The syringe is filled to within 1 in. of its mouth, taking care not to soil its unfilled portion with lacquer. After the plunger, whose sides are coated with friction grease[19], has been inserted about ⅛ in. into the barrel, the syringe is turned tip up, and when all the air has risen, the cap is removed and the air expelled. A few drops of lacquer are put into the cap and it is then again placed on the tip of the syringe which is set aside, tip down, until all of the air bubbles have risen and collected in one big bubble next to the plunger.

After spinning (during which the lacquer is protected from dust by elimination of drafts in the room[20]), the lens is lifted with a pair of crucible

[15] Elevated temperatures should be avoided in the presence of rubber stoppers.
[16] These are freed of all dust and lint by washing with filtered acetone; the same 500 ml. of acetone is poured six times through the funnel.
[17] Less satisfactory containers: 1) Screw-cap bottles, with tin or aluminum foil preventing the contents from coming in contact with the cap liner and the threads; 2) a stock bottle with a large glass bottle cap closed by a rubber stopper fitted, narrow end up, around the neck of the bottle.
[18] Made from the reducer tip that comes with the syringe, by cutting off the male portion and soldering the hole that is left.
[19] Heavy water-pump grease is satisfactory. Vaseline makes the plunger slide so easily that it is difficult to control the flow of lacquer from the syringe.
[20] A dust-free room, if available, should be used for the spinning of optical films or coatings.

tongs, having special grooves in the tips, to a metal tray in a smooth finished box the interior of which is painted with a permanently sticky coating[21]. When the tray is filled, it is transferred to an oven for baking. A slightly different procedure is used for certain thermosetting resins as described later.

Baking of the coatings

With few exceptions, the best coatings are obtained when they are baked at 150° C. for 1 hour[22]. This high temperature is essential for maximum hardness in a few air-curing, thermosetting resins; but the main reason for the high temperature is found in the well-known reluctance of coatings to yield the last traces of solvent, particularly if the latter has a high boiling point.

Lenses coated with thermosetting lacquers needing an inert atmosphere for curing are baked in a 8¾ by 6 in. gas-tight pot (Fig. 2) provided with trays, a thermometer, and inlet and outlet tubes for ordinary water or coal gas[23]. The pot is set into a regular oven and, while the oven is coming to temperature, a full stream of gas is passed through the pot for 45 minutes. Then the gas stream is reduced so as to keep a micro-burner barely lit. Curing time is counted from the time when the temperature inside the pot reaches that of the oven. Temperature schedules recommended by the manufacturer for the curing of a thermosetting resin can be followed, although thin coatings usually do not seem to suffer when the time is shortened to 1 hr. at 150° C.

Difficulties encountered

Generally speaking, a report of negative results should be made so that other workers may benefit thereby. Taking into account only the ease of spinning and the optical qualifications of the coating, it can be said that no unusable lacquers have been encountered because, in spinning, the difference between success and failure is often so small that it would be a mistake to pronounce a certain lacquer a failure even if exhaustive experiments have yielded only negative results. This is well illustrated by a lacquer which failed in a large number of experiments in spite of the fact that it had given good spin coats a few months earlier. Finally, after all mechanical modifications that were tried failed to confirm the original findings, only the weather was left as an explanation. This was the answer, for the lacquer spun properly when it was kept at 85° F. or higher—the temperature it had, no doubt, when it was originally used in the summer-time.

As regards other negative results, the data show-

[21] A lacquer made from isophorone, hydroabietyl alcohol and Aroclor 1262 is kept sticky if a dish of isophorone is kept in the box when it is not in use. This coating traps much lint which would otherwise settle on the coatings!

[22] Straight alkyd and some Vinylite resins are baked at lower temperatures. The final baking temperature for some silicones is 250° C.

[23] Only one thermosetting resin (Kriston A), which is affected by a large number of inhibitors, including water, did not polymerize in the presence of water gas, possibly due to traces of sulfur compounds that might have been in the gas.

ing that lacquers containing styrene do not spin should not be regarded as final.

The probable explanations for some of the unsatisfactory results lie in the following:

Bubbles or blisters are formed if a lacquer is poured from a height of more than 3 mm.; the plunger of the syringe has not been lubricated with friction grease; the lacquer is squeezed too fast through the tip of the syringe; and, if bubbles formed in filling the syringe (or beaker), are not given enough time to disappear. Other contributing factors are dust, lint, rouge, and microscopic rough spots in the surface of the glass, all of which serve as a focus for increased evaporation or increased (possibly decreased) polymerization[24].

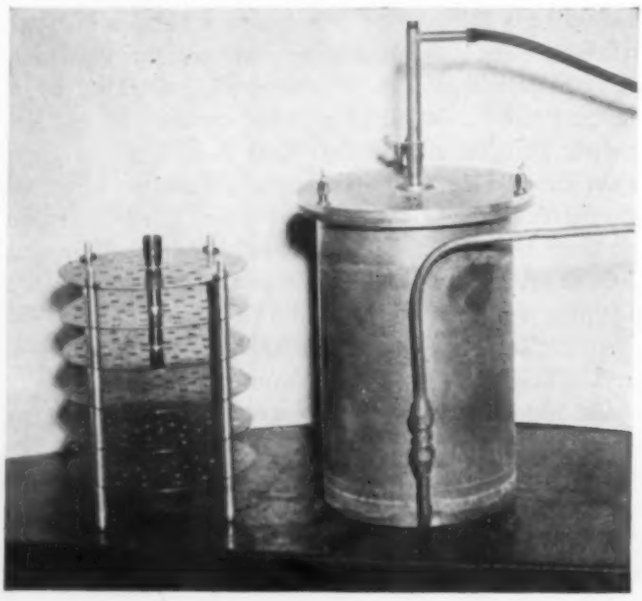
A blister may remain as such in the coating on the lens; it may break, leaving a very noticeable crater with a big rim, or it may travel across the lens while spinning and leave a track marked by optical distortion[25].

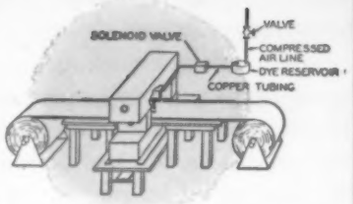
Some large bubbles are sometimes avoidable. They usually break in the lacquer blob within a few seconds and if one delays spinning for a few seconds after they have broken (just as one delays spinning any lacquer blob until it has come to equilibrium) they will do no damage.

Edge bead and dead center pile cannot be avoided because they are inherent to spin coating. Nevertheless they can be diminished sufficiently so as not to be a cause for rejection. A bevel seems to have some favorable effect on an edge bead. A dead center pile is bound to be nearly absent on a curved (ex. 6-curve) lens. A way of overcoming these two difficulties lies in the use of a lacquer with very good

[24]This last point does not apply to lacquers made from thermoplastic polymers which have the added advantage of just embedding loose foreign particles without giving rise to optical distortion.
[25]Brode, W. R. et al, J. Opt. Soc. Amer. 36, 569 (1946) recommend acetone as an effective means for reducing bubbles.

2 — Pot for curing resins in the absence of air





INSPECTION OF CONTINUOUS STRIP

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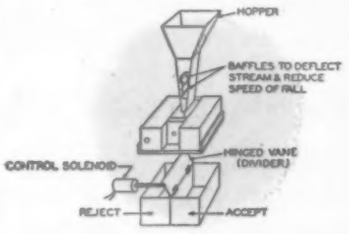

INSPECTION OF FALLING MATERIAL

A good way to inspect molding powders, fillers, and resins. When metal is detected, the hinged vane deflects the stream into the reject bin.

Electronic Metal Detector inspects plastic rolls, protects calender at National Automotive Fibres

"In one operation our electronic metal detector saved us $2,000," reports National Automotive Fibres, Inc., Trenton Division.

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In this plant, a preliminary visual inspection of plastics eliminates obvious pieces of metal. After the plastic has gone through the milling roller, the rolls are carried on a conveyor belt through the detector's inspection aperture. If metal is present, a bell rings, the roll is removed and unwound, and the particle is eliminated.

This modern electronic equipment can spot every type of metal and alloy — magnetic or non-magnetic, regardless of its depth in the material. Reports on units in use for more than two years attest to its reliability — even in detecting particles as small as 70 thousandths of an inch in diameter!

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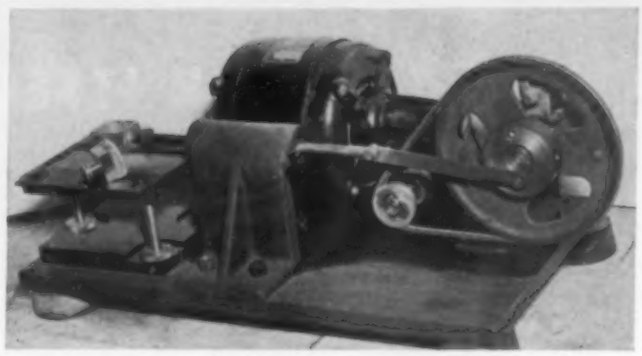

3—Arlington Wipe Test apparatus

leveling-out properties. Any undue thickness in a coating made from such a lacquer will level out. Thermoplastic resin lacquers level out best. Leveling-out is not necessarily synonymous with flow-out[26].

Wheel spoke effect is encountered if the lacquer is not viscous enough, if the chuck starts spinning at or near full speed or if the acceleration of the chuck is too rapid. Under these conditions the blob of lacquer is first thrown out like the spokes of a wheel, and even if afterwards it creeps across the lens in the manner of a uniformly expanding circle, it may not completely obliterate the original wheel spoke design. If the spinning is started with a fully covered lens, there cannot be any wheel spoke effect.

Underside fouling of a flat lens while spinning can be prevented by special construction of the chuck because other methods such as the use of masking tape or coating with a stripping lacquer are tedious at best. It may also occur through capillary action on a little excess lacquer clinging to the side of the lens when the latter lies on a tray. The obvious remedy is placing the coated lenses on pedestals previous to baking.

Cobwebbing is a serious problem with some lacquers. Vinyl chloride acetate and methyl methacrylate lacquers are worse in this respect. No satisfactory method can be recommended for overcoming this trouble.

A frozen syringe plunger is not uncommon with certain lacquers, even if the plunger has been well greased. A small beaker should be used for such lacquers.

Striations or schlieren in the coating invariably give rise to optical distortion. One cause is lack of lacquer uniformity. If by aging, a thermosetting lacquer has changed in its spinning characteristics due to an increase in viscosity, dilution of the lacquer is not recommended because it is almost impossible to achieve distribution of a freshly added solvent in

[26]Gardner, H. A. (Paints, Varnishes, Lacquers and Colors, Washington, D. C., 1940) does not differentiate between these two (pp. 237 and 356). In spin coating, however, we should like to define the two terms as follows: leveling-out is the transformation of a fluid coating with irregularities in its thickness to a coating of uniform thickness. Leveling-out is in part dependent on flow-out, but the reverse is not true. Flow-out is the property that accounts for movements in a lacquer coating when the latter is in a fluid state. Flow-out seems to be a function of internal slippage (viscosity) and wetting action. If the forces controlling flow-out are greater than those controlling leveling-out, then an edge bead may spread until it covers the greater part of the lens, or worse yet, the bead may travel intact across the lens if the latter is not kept level after spinning.

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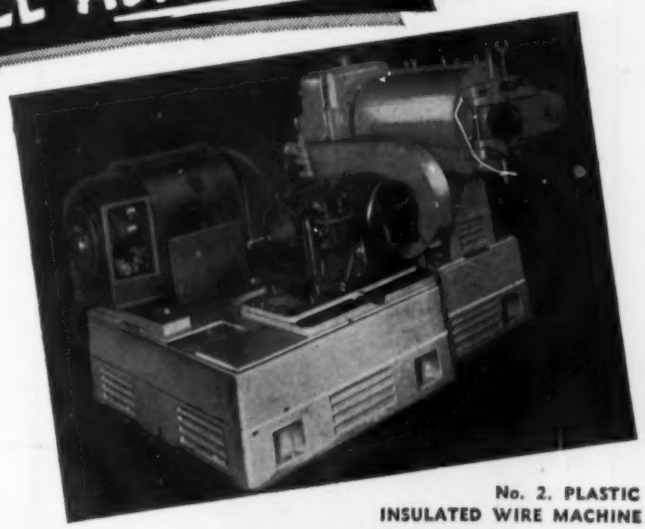

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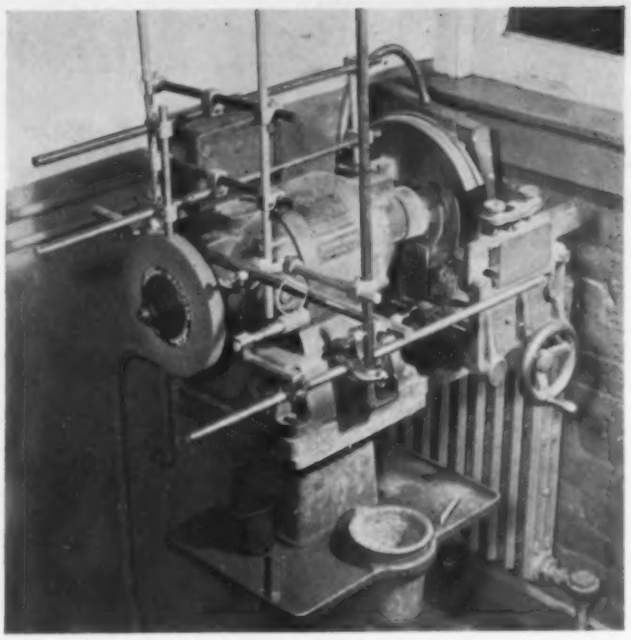

4 — Apparatus for spark test

a viscous lacquer by shaking the latter for a few minutes after the solvent has been added. If a uniform lacquer contains two solvents, one of which has a much higher evaporation rate than the other, uniformity of the lacquer is frequently endangered during vacuum distillation which leaves areas of higher concentration due to spot ebullition of the lower boiling solvents. The worst type of striations come from old thermosetting lacquers which in aging have not thickened uniformly, but contain fine strings of gelled material which are not easily seen by inspection of the lacquer in the bottle.

Tests on coated lenses

Visual examination—The coated glass 50 mm. plano lenses were examined with oblique lighting for optical distortion including that due to blisters, craters, edge bead, or other uneven distribution, not overlooking embedded particles. An occasional coated lens was viewed in sodium light for Newton's rings.

Mar and abrasion tests—The following methods were used because the equipment was immediately available at the time the work was started and not because they were considered superior to the numerous methods recorded in the literature. Scratch and indentation tests were eliminated because the coatings are, in most cases, too thin to undergo such tests. The thicknesses of the coatings varied from 5 to 30 microns. These determinations were not made for each individual coating in this preliminary work.

All coated lenses were conditioned before testing by allowing them to stand 48 hr. at 25° C. The degree of marring or abrasion of the plastic coating was estimated by the loss of reflection due to the abrasive element. This loss was determined, using

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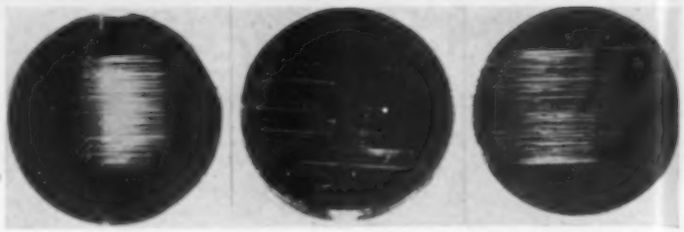


Melamine (mod.) *Polectron* *Dimethyl itaconate*

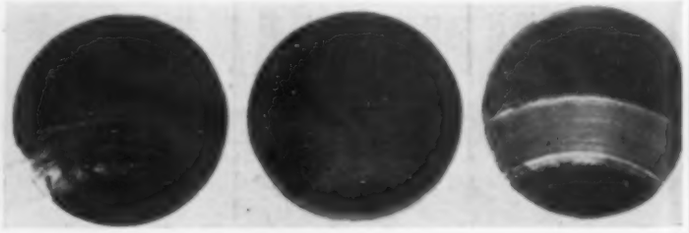
the Bausch and Lomb Glossmeter, from the difference of the galvanometer readings before and after the test. The coated lenses were treated with a light air blast to remove all lint and loose particles before the glossmeter determinations and care was taken in orienting the abraded areas in a precise manner with a special holder so that the light beam would be reflected from the same spot for all coatings. At least two coated lenses for each coating were subjected to each of the tests.

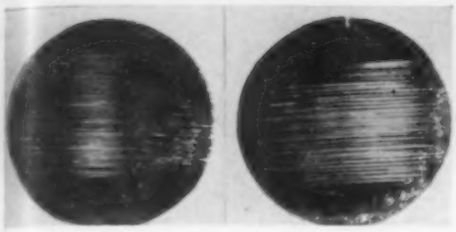
The differences in the galvanometer readings obtained with the different coatings are summarized in Table II, p. 125. The readings are grouped as follows: Coatings showing a loss in points from 0 to 4 inclusive are included in group 1; 5 to 9 inclusive —group 2, and so on.

Arlington wipe test—The authors are indebted to the Plastics Dept. of E. I. du Pont de Nemours & Co., Inc., for the details of this method. Fig. 3 (p. 172) is the apparatus used. The 1 in. square bottom of a non-magnetic steel block was covered evenly with a piece of billiard cloth which in turn was covered with soft, 4-ply cheese cloth held to the block by a pinch ring. The total weight of the covered block was 100 grams. The cloth-covered block was pushed freely back and forth by the mechanical device 5000 times (at the rate of 43 one-in. strokes per min.) over the same track on the coated surface of the lens. The results are tabulated in column 9 of Table II. Many of the coatings resisted this type of wear and, in fact, a polishing or increase in gloss took place simultaneously with the wearing action of the cheese-cloth. No particle abrasives were used in this test.

Taber abraser with cotton plug—The abrasive

Trimethyl cyclohexyl methacrylate *i-Butyl methacrylate + pentalyn* *Cyclohexyl methacrylate*





5—Arlington wipe test with cheese cloth

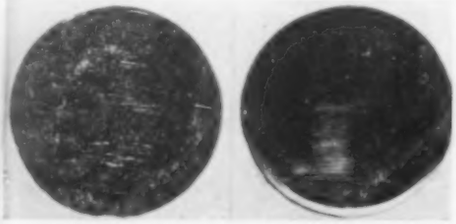
Silicone-2103 *Polystyrene*

wheels of the abraser were replaced by a cotton dental roll. This was affixed to the machine arm which resulted in a weight of 1 lb. resting on the surface to be abraded. The lenses were protected from foreign particles during the test which was concluded after 5000 cycles. After each 1000 cycles, the lens surfaces were blown free of lint with the air hose and the cotton plug trimmed. A new cotton roll was used for each pair of coated lenses. An attempt was made to obtain a more absolute comparison of the abrasion by a microscope count of the actual scratches in a given area of the abraded track. Dark-field illumination was employed at 40 power magnification using an eyepiece micrometer but the coatings varied so greatly in their behavior that the scratch counts were quite unreliable. Column 10 of Table II lists the results with the cotton plug.

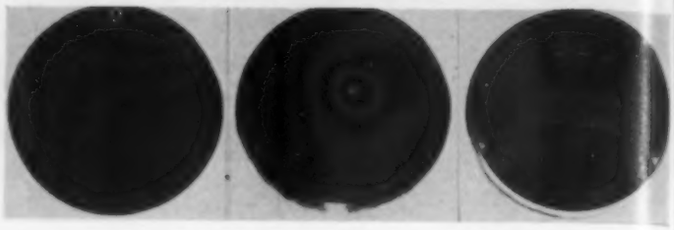
Taber abraser with calibrase wheels—This well-known apparatus was employed with the CS-10 Calibrase wheels. A multiple chuck was used so that a pair of coated lenses (same resin) could be run at the same time a pair of uncoated lenses were abraded. The lenses were rigidly fixed so that they could not rotate and the test was concluded after 25 cycles. The results are shown in column 11 of Table II.

Carborundum drop test—This test was patterned after the official A.S.T.M. method (D 673-44) although it was not exactly duplicated. Because of the large number of coating compositions, including both very soft and hard resins, the loss of gloss due to only one fixed amount (250 grams) of No. 80 carborundum was measured and not the average of five increasing weights as required in the official method. Otherwise, the precautions recommended by A.S.T.M. were observed. It was of interest to deter-

Cerex *Forticel*



5 — Taber cotton plug



Glass *CR-39* *Melamine (mod.)*

mine how much the carborundum dust adhering to the coating would affect the glossmeter readings, hence the loss of reflection of the abraded area was determined before (column 12) and after (column 13) cleaning off the dust. The latter reading would represent the actual abrasion.

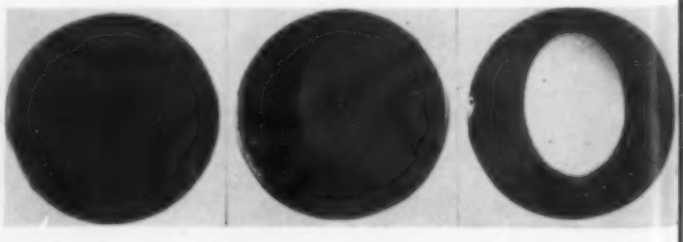
Tumbling sand test—The uncoated side of the 50-mm. flats employed for all tests was covered with masking tape, and they were then inserted, coated side out, into snap-in type holders fastened to a ring on the wall of a 9-in. (diameter) by 10-in. (height) steel cylinder, closed at one end and provided with a lid on the other end. There were no cross-beams, braces, or any other impediments to the free flow and tumble of 15 lb. of glass plant sand. The cylinder was rotated at 80 r.p.m. for 1 hr. in one direction and then 1 hr. in the opposite direction. The lenses were freed of sand by a blast of compressed air, the masking tape was peeled off, and a glossmeter reading was taken to determine the loss of reflection (column 14).

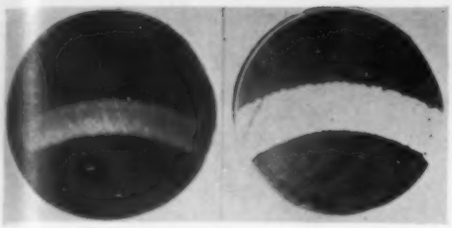
The objections raised by Axilrod and Kline[27] are believed to be minimized by the introduction of a "standard" coated lens in each tumbling. This standard can be a soft coating as polystyrene or a hard one as melamine or both.

Spark test—The equipment required is shown in Fig. 4, p. 174. A lens was mounted upright so that the coated side received a maximum concentration of sparks when facing the source of sparks 9 in. away. The sparks came from a 9 by 15/32-in. carbon steel drill rod (FR-27) held loosely in ½-in. guides and resting freely in a vertical position (about 0.4 in. off center in the direction of the rotation) on a high speed (3485 r.p.m.) carborundum grinding wheel 7 13/16-in. diameter, 1-in. face) while the

[27] "Study of Transparent Plastics for Use on Aircraft," by B. M. Axilrod and G. M. Kline, J. Research NBS *19*, 367 (Oct. 1937).

Glass *CR-39* *Ethyl cellulose*





7 — Taber abraser, CS-10 wheels

Vinylite VYHH *Selectron*

latter is in motion. A 3-min. exposure per lens removed a little less than 1.5 grams of drill rod. The grinding wheel was a "Waltham" grain and grade 46M. The lenses were held rigidly upright in grooved pieces of rubber tubing covering two short ½-in. flexaframe rods. The loss of reflection or gloss is shown in column 15 of Table II.

Roof exposure—Pairs of the coated lenses were exposed on the roof (Rochester, N. Y.) until the coatings peeled, blistered, or otherwise became optically useless. The exposure results are given in days.

Water tests—The coated lenses were completely immersed in distilled water at room temperature. They were examined twice daily and were removed from the test when they showed the first sign of peeling or became so spotted as to be unusable. The results are given in days.

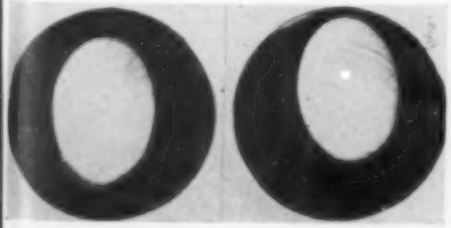
Discussion of test results

Photographs of typical abraded coatings are shown in Figs. 5 to 10. The abraded coated plano lenses were coated by evaporation with aluminum and then photographed with oblique illumination.[28]

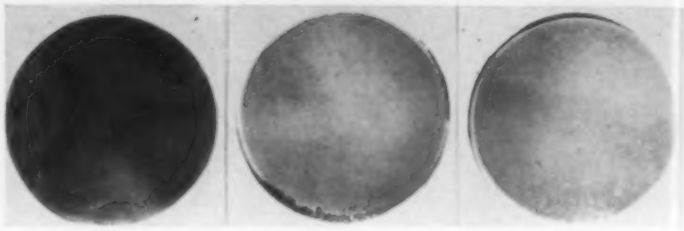
The Arlington wipe test with cheesecloth gave unsatisfactory results due to the simultaneous polishing and rubbing action. Although the modified melamine and silicone 2103 suffered little loss of gloss (column 9 of Table II) the photographs in Fig. 5 show that the surfaces were marred. The melamine coating was not made unfit for use but the silicone 2103 coating was almost opaque. Microscopic examination showed the marks on the melamine to be fine scratches but those on the polystyrene, silicone,

[28]Wratten metallographic plates were used, exposed for ¼ sec. at f/16 and developed in Eastman D-19 for 4 min. at 65° F. Illumination was secured with a 200-watt bullet lamp, placed 1 ft. from the abraded lens. For making positives, grade O Apex paper was used with 5 sec. exposure on an Eastman contact printer having four 25-watt bulbs. Developing time at 70° F. was 30 sec. using Eastman D-72 developer diluted 2:1.

Lucite HG-1 *Kotol*



8 — Carborundum drop test



Glass *Lucite HG-1* *VYHH*

ethyl cellulose, and others were composed of stripes. CR-39 coating showed very fine few scratches.

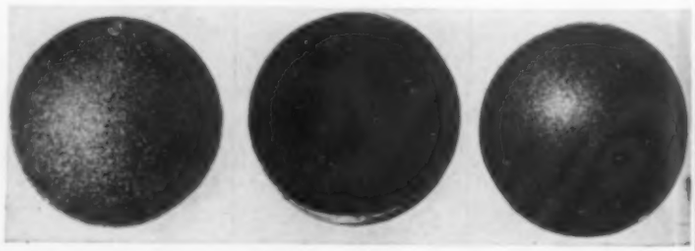
The Taber Abraser test using a cotton plug was also complicated by simultaneous polishing and abrading action. Examples of the results (column 10) are shown in Fig. 6. The Cerex coating was almost worn away by the cotton which accounts for its rating. The modified melamine, CR-39, and Vibrin coatings showed little effect from the rubbing. Silicone-2103, Polectron, Selectron, and the polybutyl methacrylate-Pentalyn compositions showed little resistance to this type of marring. The rating of Vinylite VYHH was raised by a silicate coating.

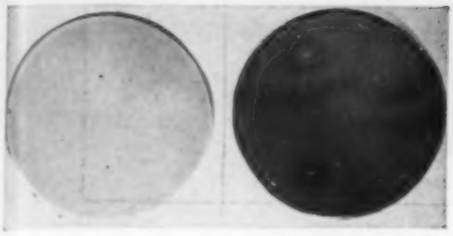
The Taber Abraser, using CS-10 wheels, gave results (column 11) which were considered satisfactory. Uncoated glass was apparently unaffected. CR-39 was the most resistant with Vibrin-1305, modified melamine, diallyl phthalate, and a CR-39 Dd composition next in resistance. The resistance of Lucite was slightly improved by treatment with silicon tetrachloride. Examples of different degrees of hardness are shown in Fig. 7.

The carborundum drop test likewise gave results (column 13) which were consistent. The abraded areas were barely visible after the removal of adhering particles from uncoated glass and the CR-39 coating. The marring was readily visible on all the other coatings. The alkyd-modified melamine and Melmac 245-8 coatings rated next in resistance. Hard and soft coatings are illustrated in Fig. 8.

The tumbling sand (column 14) produced a greater loss of gloss than any of the other methods used. As already pointed out[27], it is very difficult to remove fine adhering sand particles. The careful use of a brush and airblast aids in preparing the sample for the glossmeter test. Glass was affected least. Allymer CR-39, Vibrin-1305, Norton resin,

Glass *CR-39* *Melamine*





9—Tumbling sand test

Polectron *Lucite HG-1 + silicate coating*

and cyclohexyl methacrylate were next in resistance—the increase in loss of gloss from the actual galvanometer readings being in that order. Four coatings are compared with glass in Fig. 9.

The spark test is one in which glass shows a lack of resistance. The hot metal sparks impinging upon the glass apparently fuse to the surface but are thrown back by certain plastics. Again, Allymer CR-39 is among the most resistant, together with the modified melamine, Vibrin-1305, diallyl phthalate, Norton resin, and others. Silicate coatings failed to improve Lucite HG-1 and Vinylite VYHH. All of the coatings, except Silicone 2103, rated higher than glass. Typical results are illustrated in Fig. 10.

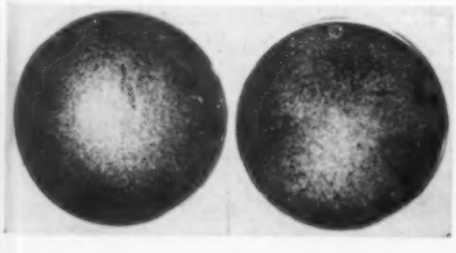
The roof test (column 16), obviously a very severe one, indicates possible special uses for certain optical coatings. The Silicone-2103 showed a slightly crazed surface at the end of 94 days but its adhesion to glass has not been lost up to the present time (300 days). The 3,3,5,-trimethyl cyclohexyl methacrylate and Kotol weathered exceptionally well. Polectron yellowed on exposure.

The water immersion test (column 17) also shows the relative adhesion of the coatings to glass. Silicone 2103 showed sufficient crazing after 56 days to cause its removal from the test. The 3,3,5-trimethyl cyclohexyl methacrylate and Kotol also adhered very well to glass. The hard coatings, such as CR-39, melamine (modified), and Norton resin did not resist the water immersion.

Acknowledgment

The authors are indebted to many plastic manufacturers for materials and to members of Bausch & Lomb Optical Co. for assistance and advice during this work.

Ethyl cellulose *Cellulose nitrate*



10—Spark test

THE PLASTISCOPE*

INTERPRETATIONS OF THE CURRENT NEWS

By R. L. VAN BOSKIRK

Polyester for lenses

THERE has been some question in the plastics industry as to what ever happened to Columbia Chemicals Allymer CR-39 which was practically the first resin to become widely known as a polyester for laminating purposes. Some time ago the Allymer series was withdrawn from the market, but CR-39 monomer has been in circulation on a limited scale under the chemical name allyl diglycol carbonate. Cast CR-39 is now commercially available from several sources and is offered primarily as a material with unusual optical clarity and surface hardness.

CR-39 was superceded in the laminating field by materials which cured in much shorter time. The price, in the 50¢ range, was slightly higher than some of the competing laminating resins.

Today CR-39 is being used on small scale jobs for casting lenses, flat sheets, small mirrors, decorative art pieces, etc. It is thought to have unusual possibilities for use as a television lens. Among the casting resins, it is best known for its resistance to abrasion—developers assert that it is 10 to 30 times as resistant to scratching as acrylics. Peculiarly enough, it does not weather as well in certain respects as acrylic in accelerated tests, but practical tests over a period of years have shown weathering qualities of unusually high standards. It is also solvent- and craze-resistant. During the war it was sold by the company's glass division under the name Allite, principally for aircraft glazing.

By the end of the war, Wright Field had recommended that CR-39 be used in glazing applications wherever possible. The reduction in the aircraft building program prevented this recommendation from being carried out to any extent. An additional factor was that CR-39 could not be directly substituted in many existing designs due to the complex curvatures. Cast CR-39 is capable of being post formed to limited curvatures, but complex and extreme curvatures must be obtained by casting in glass molds.

CR-39 production is part of a general development in the system of phosgene chemistry, and it is believed that it will eventually find an important place on a limited scale in the plastics industry where abrasion resistance, surface hardness, and optical properties are of importance. In addition, there are certain places where it may serve well as a modifying agent in other polyester resins.

*Reg. U. S. Patent Office.

Rubber companies' sales

APROPOS of the articles running in this magazine on rubber and plastics (June, p. 89, and this issue, p. 93) and the growing participation of the rubber industry in plastics, it is interesting to note the following estimated breakdown, by Standard and Poor's Corp., on the various rubber companies' divisions of sales as between tire and non-tire products.

	Tire & tube sales, %	*Non-tire sales, %*
Dayton Rubber	50	50
Firestone T & R	62	38
B. F. Goodrich Co.	60	40
Goodyear T & R	75	25
Lee Rubber & Tire	67	33
Norwalk T & R	73	27
Seiberling Rubber	90	10
U. S. Rubber Co.	62	38

It is predicted that there will be an ever-increasing portion of this non-tire sales total devoted to plastics materials.

Plastics from molasses

ACONITIC acid, which is becoming increasingly important in the manufacture of softening agents for plastics and rubber, is a by-product of a new process of extracting molasses from sugar cane, according to Godchaux Sugars, Inc., New Orleans, La.

The company reports that 180 tons of the acid were extracted from sugar cane last year in a single plant at Raceland, La. Recovery of the chemical is accomplished by heating the molasses and adding lime and calcium chloride. This treatment produces insoluble crystals containing calcium, magnesium, and aconitic acid, which are then removed by a centrifuge. Further chemical treatment recovers the aconitic acid.

Air blade for coating

AN ingenious tool for spreading vinyl, latex, pastes, and organosols on paper has been recently called to our attention. It is S. D. Warren Co.'s 89 Broad St., Boston, Mass., "air blade" which gives precise control of coating weight or thickness of the compound. The success of the tool is credited largely to a long, narrow jet of air expelled from the blade which impinges on the coated paper to blow off excess material and insure a uniform coating. Controls are exercised by regulating speed of the paper; consistency or viscosity of the coating medium; position of the air blade; and air pressure in the blade.

Softwood plywood

PRODUCTION of softwood plywood for 1947 amounted to 1,700,466,000 sq. ft., an increase of 18% over the 1946 total of 1,436,065,000 sq. ft., according to the Bureau of the Census, Dept. of Commerce. The 1947 total was only 8% less than the record production of 1,840,231,000 sq. ft. reported for 1942.

During the past six years, there has been a considerable shift in the relative importance of interior (moisture resistant) and exterior plywood. In 1942, exterior plywood accounted for only 15% of the total production. With the exception of 1946, this proportion has increased each year so that in 1947, production of exterior was 35% of the total.

The increased production of exterior plywood has caused a marked shift in the quantity of the major types of adhesives used. Exterior plywood is bonded with phenolic

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resin glue. Interior (moisture resistant) is bonded principally with soy bean glue, casein, and urea resin. Consumption of phenolic resin glue, used to bond exterior, is generally reported on a "wet" basis. That is, the glue is purchased in liquid form, and the poundage reported includes water as well as glue. On the contrary, other glues used to bond interior plywood are generally reported on a "dry" basis, which represents the weight of the glue powder only. Thus, the production of exterior per lb. of glues used appears low in comparison with interior.

Consumption of glue by plywood industry

	1947	*1946*	*1945*
	(thousands of lb.)		
Total, all types	68,941	55,970	47,302
Casein	5,260	5,488	3,287
Soybean	24,728	23,817	22,473
Phenolic resin	36,054	24,743	19,393
Other	2,899	1,922	2,149
	1944	*1943*	*1942*
Total, all types	55,941	53,151	61,736
Casein	1,935	3,936	3,595
Soybean	27,879	26,086	37,380
Phenolic resin	23,067	19,764	17,262
Other	3,060	3,365	3,499

Polyethylene chips

ANOTHER interesting use for polyethylene has been developed in the Pittsburgh, Pa., area where the Industrial Lining Engineers, Inc., Sewickley, Pa., is furnishing extruded polyethylene strip and cutting it into short pieces which can be used to suppress foam in all types of aqueous solutions. It is particularly adapted for use in electroplating chrome baths.

Polystyrene was the first plastic used for this purpose, as announced some time ago, but this is the first report of polyethylene for the same purpose. The 2 in. long, 1 in. wide, and 1/16 in. thick polyethylene chips float on the surface of a solution, thereby reducing the exposed surface and by their motion mechanically destroying foam as it is formed.

The extruder, when informed that the strip would have to have a slight curvature in order to help keep the chips from sticking to each other in the bath, simply placed an air blast under the extrusion, just as it came out of the die, to produce a short curvature; for a long curvature, the strip is wound on a cylinder or roll. To get a rough surface to further aid non-sticking of the chips, the extruder ran the polyethylene at lower than average temperature.

Utility in hotels

PLASTIC sheet with the appearance of fine-grained leather is finding increasing use in the Hotel Taft in New York, N. Y. The material is Blanchardized Vinylite, marketed by United States Plywood Corp., and is a clear vinyl sheet with the leather look resulting from a decoration on the under side, (See also "Versatile Vinyl Sheeting," Feb. 1948 MODERN PLASTICS, p. 94.)

The Hotel Taft is utilizing the material in spots where it gets hard wear, such as elevator corridors, for sides of bars, and for furniture coverings. A vinyl frame is also being made for the hotel to hold registration cards, where ink and finger marks are a constant problem.

Nitrile rubber-vinyl latex

VINYL latices, although on the market for several years, still rank as something new in the plastics industry except with a small number of operators who have had experience working with rubber latex and have water equipment already installed. There are various dispersion and emulsion systems in use by vinyl processors, but most of them require solvents. A latex system, as contrasted with dispersion and emulsion systems, eliminates solvents and thus avoids toxic vapors and fire hazards.

The B. F. Goodrich Chemical Co., Cleveland, Ohio, has been promoting vinyl latices for several years in the belief that their qualities offer many advantages in certain types of processing. Their 31X Latex (see Feb. 1948 MODERN PLASTICS, page 81) has aroused considerable attention, with emphasis directed toward its "curing at room temperature" property. Now the same company has announced a companion called Geon polyblend latex, a colloidal blend of polyvinyl chloride and Hycar nitrile rubber, which will also dry at room temperature. It differs primarily from 31X in that the nitrile rubber performs as a plasticizer. It is supplied as a liquid containing 45 to 50% solids, with a specific gravity of 1.08 and good mechanical stability.

The resulting film has a tear resistance of 1000 lb. per in., a tensile strength of 2000 p.s.i., and an elongation of 350 percent. A 10 minute fusion at 300° F. will raise the tensile strength to 3500 to 4000 p.s.i. and the elongation to 600 to 700% but will lower the tear strength by about 20 percent. The film will heat seal at 280° F. Its low temperature flexibility is good; it is still flexible at −50° F. It is tasteless and non-toxic.

A 2 mil film has a water vapor transmission of 6 to 8 grams per 100 sq. in. in 24 hours. While this is too great for a cheese wrapping, the water-vapor transmission is ideal for oleomargarine and meats where exceptionally low water vapor transmissions are objectionable since they prevent normal "breathing." This water vapor transmission, combined with the good low temperature properties, also should make the latex film excellent for packaging frozen foods.

A dielectric strength of about 800 volts/mil open up possibilities for the material in electrical applications.

Geon polyblend latex offers many advantages over materials now in use in the decorative coating field. The gloss of the coating produced is high, and this is maintained even if the latex is highly loaded. The heat stability is good, and the greaseproofness is not impaired even though the coated material is flexed at very low temperatures.

In addition to purely decorative coatings, a few other possible uses for latex coated paper and boxboard are packaging for bread, doughnuts and other greasy pastries, gum and candy wrappings, cigarette packages, and cardboard milk containers. The material is available at present in sample quantities only but will be ready for commercial marketing in from 30 to 60 days.

Pioneers

THE Pioneers of the Society of the Plastics Industry met in a closed session in May and adopted a newly drafted Constitution as the official working set of bylaws under which the Pioneers will operate as an organization in the future. Herb Spencer of Durez Plastics and Chemicals, Inc., was elected president at the first general election under the new Constitution; other officers elected were N. A. Backscheider, Kirk Molding Co., vice-

This ingeniously designed camera is the achievement of ANSCO. The three main housing parts are precision molded by Plastic Manufacturers to provide light-tight construction. The diagonal contours and cross-section of the housing interior require a complex mold design.

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president; Hans Wanders, Northern Industrial Chemical Co., secretary-treasurer, all for two- year terms and also to serve on the newly-formed Board of Governors. Other elected members of this board include A. C. Manovill, J. B. Neal, and E. F. Bachner, all for terms of one year each, and William Woodruff, Garson Meyer, and Alan S. Cole, for terms of three years each.

Commercial closures

THE plastics industry is now contributing nearly 2,000,000 lb. a month of finished closures to the packaging trade, according to figures which the Bureau of the Census started compiling in January of this year. The figures for 1946 and 1947 comparing numerical production of metal and plastic closures are given below, along with January and February 1948 production figures:

	Metal	*Plastic*
	(in thousands)	
1946	4,182,012	2,569,367
1947	3,125,956	2,230,166
Jan. '48	646,088	171,690
Feb. '48	666,942	200,667

The 172,000,000 plastic closures made in January of 1948 required 1,720,996 lb. of molding material, from which it can be estimated that the 2,230,000,000 plastic closures produced in 1947 consumed some 22,000,000 lb. of plastic.

Welded vinyl chloride

JOINING of plasticized polyvinyl chloride parts by welding is widely practiced in Germany, according to a report now on sale by the Office of Technical Services, Dept. of Commerce, Washington 25, D. C.

Mimeographed copies of the report (PB-79583, The welding of polyvinyl chloride, Summary of German practice, 12 pages) cost 50¢.

COMPANY NEWS

Michael Wood Products, Inc., 625 Midland Ave., Garfield, N. J., is offering a newly developed "Kube-Kut" sawdust intended primarily for drying and polishing of plastics, metals, and other materials. "Kube-Kut" is specially made from green maple sawdust at logging operations. It is said to easily shake free of products treated with it and not to pulverize readily in tumbling processes. The sawdust cubes are available in a variety of meshes.

Orange Machine Products, Inc., has moved its plant to larger quarters at 82 Main St., West Orange, N. J. The company is now equipped to make a variety of ground forms, such as beads and balls, and a number of other shapes, from plastics, fiber, hard rubber, etc.

O. E. Pfannkuch and Co., 152 Main St., Bridgeport, Conn., has been appointed factory representative by The Northeastern Molding Co., New Haven, Conn. Mr. O. E. Pfannkuch has served nine years with Bryant-Hemco as assistant to the president and 18 years as factory representative, selling to Conn. electrical and automotive equipment makers.

The Plastic Div., of Reynolds Metals Co., 19 E. 47th St., New York, N. Y., has announced a lower gage member of the Reynolon 1000 Series. This new transparent polyethylene film is now available in 0.0015-in. gage in a maximum width of 45 inches. Because of the manufacturing procedure, this 0.0015-in. polyethylene film is transparent and non-oriented and will be produced in addition to the standard gages of 2 to 5 mils. Reynolds Metals Co. is now accepting small trial orders for this new gage.

Most promising outlets for Reynolon 1150 (polyethylene 0.0015 in.) are expected to be as packaging for meat, fish, biscuits, confectionery, and frozen foods.

Samuel P. Sadtler and Sons, Inc., consulting chemists, 2100 Arch St., Philadelphia 3, Pa., is now making analyses of plastics to determine their chemical characteristics and to make possible identification by infra-red methods. The infra-red technique is said to tell definitely what plastic is used in a given object and frequently indicates the degree of polymerization. Infra-red is also used to identify mixtures of plastics as well as the plasticizers.

Celanese Corporation of America's plant in Canada for preparation of cellulose will soon be under construction. It is estimated that about two years will be required to complete the project. Present plans call for a production capacity of 200 tons daily of highly purified cellulose, which will be used to supply a substantial share of the company's expanding requirements of cellulose for yarns and plastics.

American Wood Products Sales Co., eastern sales representatives of Frank Miller and Sons, wood flour manufacturers, has moved into new and larger office quarters at 225 Broadway, New York, N. Y.

American Cyanamid Co.'s "Plastics Newsfront," a house organ for the Plastics Dept., won its second citation in the past year when recently given top award for "excellence of editorial content; effectiveness of design; and achievement of purpose," among more than 600 entries in a contest sponsored by the International Council of Industrial Editors.

Tennessee Eastman Corp. has moved its Chicago, Ill., sales representatives' headquarters to the London Guarantee and Accident Bldg., 360 N. Michigan Ave. At the same time Cyril B. Fox, Jr., who was a member of the Tenite organization at Kingsport, Tenn., was appointed as a Tenite sales representative in the Chicago area.

Socony-Vacuum Oil Co., Inc., has authorized the Vulcan Copper and Supply Co. of Cincinnati, Ohio, to erect units to produce ethylene by a new process using low-grade petroleum and residual oils. Ethylene is used extensively in the manufacture of polyethylene, styrene monomer, and various other plastics. It has been obtained heretofore from petroleum as a by-product present in such low concentrations as to require expensive separation processes. Socony-Vacuum predicts that the new process will assist in reducing costs of certain plastics products through increased supplies of basic materials.

Silvio Pinto, 37 Overlook Ter., New York 33, N. Y., has developed a new method of protection for step-index tabs, using laminated acetate. Only 0.0015 in. thick, the laminated acetate covering on the tab, according to the originator, is practical for step-indexed printed matter with more than three tabs where other tabs would be bulky and unwieldy. The material used brings out brilliancy of inks without bleeding, and its flexibility strengthens the paper tab. Also eliminated is the danger of tearing the tab from the page, which frequently occurs when tabs are of greater thickness than

the paper itself. The new protective covering will be marketed under the trade name of Topin Laminated Acetate Tabs.

Croasdale and DeAngelis, Inc., plastics fabricators, has changed its plant location from Eagle and Lawrence Rds., Upper Darby, Pa., to West Lenni Road, Lenni, Pa. The move was made to improve the facilities required for experimental operations. The company has also announced the re-election of J. A. Okie as president and the appointment of Carl Boyer, Jr., as sales manager.

Plastic Center Co., successor to Rubie K. Mark Plastics Co., has opened a new Los Angeles plastic materials sales office at 931 S. Grand Ave., Los Angeles 15, Calif.

G. Felsenthal and Sons, 4100 W. Grand Ave., Chicago, Ill., are tooling up to go into the pressure and vacuum forming of sheet acrylics, vinyls, and other suitable plastic materials on a large scale. The applications the company has in mind are primarily large pieces, such as outdoor signs and juke box components.

Bakelite Corp. has announced the following changes in technical sales representative territories: L. E. Whitmore, formerly with the Coatings Laboratory at the Mellon Institute, has been appointed technical representative of the Coatings and Adhesives Div., Thermoplastics Dept., and will be located in the company's Pittsburgh, Pa., office.

Philip Magnusson has been transferred from Bakelite Corp.'s New York office to the Philadelphia office where he will serve as technical representative for the Calendering Materials Div., Thermoplastics Dept.

R. A. Richards has been transferred from the company's Philadelphia office to the Detroit office and will serve as technical representative of the Molding and Extrusion Materials Div., Thermoplastics Dept.

The Low and Preston Co., 4 Smull Place, Port Washington, N. Y., has incorporated under the name Lunn Laminates, Inc. No change in management, personnel, or location is involved.

Cutler Sign Advertising Co., 2026 N. 22nd St., Philadelphia, Pa., has established a combined plastics division for its sign and illumination operations. Among outstanding projects which Cutler has helped pioneer was the all-plastic Sunoco sign.

The new division will be under the direction of Robert I. Tomlinson, who served eight years with Rohm and Haas Co. Mr. Tomlinson will also direct research with the Cutler staff on new uses for plastics in connection with ultra-modern cold cathode lighting.

The Glenn L. Martin Co., Baltimore, Md., has appointed Wesley S. Thurston to its public relations staff and Walter W. Peacock, Jr., as technical sales representative for the Chemicals Div. Mr. Thurston was for two years director of public relations for the Society of The Plastics Industry, Inc., and will work closely with the Chemicals Div. Mr. Peacock was formerly with Stanley Chemical Co., and will cover New England and New York City for the marketing of Marvinol VR-10 and other products of the Chemicals Div.

Koppers Co., Inc., has consolidated its divisional sales offices in the New York area in the Empire State Bldg., New York, N. Y. This central office will cover divisions formerly occupying space at three different locations in New York City and at Kearny and Westfield, N. J.

Five different Koppers sales offices in the Chicago, Ill., area have been consolidated in the Peoples Gas, Light and Coke Bldg., Chicago.

Manhattan Chemicals, Inc., New York, N. Y., has purchased a 20-acre plant and laboratory in Black Lick, Pa., where it proposes to offer to clients increased production facilities for halogenation, sulphonation, distillation, etc. On the same premises is a trained crew and the equipment necessary to perform the most difficult chemical processing assignments. Manhattan Chemicals will produce those chemicals which its clients cannot because of location restrictions, lack of space, equipment, or personnel. I. Victor Monoson is plant manager.

Spencer Kellogg and Sons, Inc., Decatur, Ill., has developed a new refined soybean protein for industrial use which is expected to be applicable in paper and paper converting, protective coatings, glues, and plastics. Trade named "Kelkote," the material is a fine powder, light cream in color, with high adhesive strength, and compatible with isolated proteins, casein, latex, and various pigments. "Kelkote" is already in use in the preparation of wallpaper coatings, and further research is expected to develop many additional applications, especially as it is low in cost compared with other commercial proteins.

Steiner Manufacturing Co., 47-30 33rd St., Long Island City, N. Y., fabricator of methyl methacrylate sheets, has appointed Arthur V. Todd, formerly connected with the General Electric Co., as its central New York area representative.

General Electric Co. has announced appointments of Charles W. Bentley as assistant to the manager of the company's new Decatur, Ill., plastics molding plant; Frank E. Golliher as production supervisor of its Plastics Div.; and David B. Folkerth as the Chemical Dept. district representative at the Pittsburgh, Pa., office.

Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass., has announced that southwestern headquarters of its manufacturing subsidiary, Cabot Carbon Co., for the production of carbon black, will be housed under one roof in Pampa, Texas, as soon as construction of a new, six-story office building is completed.

PERSONAL NEWS

Raymond B. Seymour, well-known in the field of plastics research, has resigned his position as director of the Industrial Research Institute of the University of Chattanooga. Previous to this position, he was with Monsanto Chemical Co.

Larry Spiwak has been named manager of Technical Service and Development (for resins and adhesives) of Snyder Chemical Corp., Bethel, Conn. He was previously in charge of the company's Research and Product Development Laboratory.

Michael A. Brown, Jr., has been appointed sales promotion manager of Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio. He has been associated with the plastics

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industry 10 years, serving successively with MODERN PLASTICS Magazine, Monsanto Chemical Co., and *Plastics* Magazine.

Announcement was made at the same time of the promotion of George A. Taylor to advertising manager in the sales promotion dept. at Plaskon, after serving as assistant advertising manager since 1947.

Gilbert B. Kahn, for many years connected with Consolidated Products Co., has set up his own organization for buying, selling, appraising, and liquidating machinery, equipment, and complete plants in the chemical and allied industries. Offices and facilities are located at 75 West St., New York, N. Y.

Bert S. Cross was recently elected vice-president in charge of the Scotchlite Div., Minnesota Mining and Manufacturing Co., St. Paul, Minn. He joined the firm in 1926 and has headed development and sales of "Scotchlite," a material which reflects light brightly in color when seen under auto headlights at night. The plastic varieties are used to reflectorize traffic signs, outdoor advertising signs, water buoys, trucks, buses, and bicycles.

Roy Dean, general manager of Kurz-Kasch, Inc., Dayton, Ohio, has been elected to the Board of Directors to fill the vacancy caused by the death of H. J. Kasch, Sr. The Board also re-elected J. J. Bauman, president; W. G. Davidson, treasurer and also vice-president in place of Mr. Kasch; and R. F. Young, secretary.

Howard M. Hubbard was appointed president of The Hydraulic Press Manufacturing Co., at a recent meeting of its board of directors, to fill the vacancy created by the resignation of H. A. Toulmin, Jr., last November.

Julian Cerf, formerly president of Plasticote Fabrics Corp., Paterson, N. J., has sold his factory and is now associated with The Brunsene Co., East Cambridge, Mass., as sales representative with headquarters at 267 Fifth Ave., New York 16, N. Y. The Brunsene Co. produces coated textiles, including rubber, vinyl, and pyroxylin coated artificial leathers and light weight materials of all types, both plain and embossed.

John E. Currier has assumed the duties of A. C. Wiebe, who recently retired as New York representative of the F. J. Stokes Machine Co. Mr. Currier has been associated with Bakelite Corp., for the past nine years as technical representative and will specialize in plastics molding machinery at F. J. Stokes.

Otis R. McIntire has been named laboratory research director of the Saran Polymerization Laboratory at The Dow Chemical Co., Midland, Mich. He replaces Dr. G. W. Stanton, who transferred to the company's Great Western Div., where he will head activities of a new polymerization laboratory being formed at Dow's Pittsburg, Calif., plant.

H. H. Bashore, well-known rubber technologist, has established a consulting service under his own name at 1 N. LaSalle St., Chicago, Ill. Mr. Bashore offers services covering research, development, production, and sales engineering in both rubber and plastics.

Dr. Charles Allen Thomas, executive vice-president and technical director of Monsanto Chemical Co., St. Louis, Mo., was awarded the 1948 Gold Medal of The American Institute of Chemists. The award was made in recognition of his work in the development of atomic energy and his leadership in research, particularly in synthetic resins, and for his administrative ability and his encouragement of basic research.

Theodore O. Woldt has joined the sales force of Plaskon Div., Libbey-Owens-Ford Glass Co. Mr. Woldt was formerly with Globe Varnish Co., of Chicago, Ill., and more recently with the War Assets Administration in Chicago. He will represent the company in the sale of synthetic coating resins in the Chicago area.

Paul R. Oliver has been named West Coast manager of Farrel-Birmingham Co., Inc., with his headquarters at 2039 Santa Fe Ave., Los Angeles, Calif.

T. Walter Noble has joined the Morart Gravure Corp., Holyoke, Mass., as general manager and technical director, after 12 years with Fabricon Products, Inc., Detroit.

A. (Speed) Raysson has been appointed sales and merchandising manager of proprietary items for the Plastics Div. of General American Transportation Corp., Chicago, Ill. He will be in charge of the company's sales of infant's training seats, tableware, houseware and chinaware items, etc. Mr. Raysson recently resigned as general sales manager of the Domestic Appliance Div. of Pressed Steel Car Co.

Charles F. Hosford, Jr., has been appointed West Coast manager of the Chemical Div., Koppers Co., Inc.

Lester L. Bauer, director of engineering at Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio, has been advanced to director of production to succeed Bernard W. Slater, resigned.

Harrison N. Van Duyne has been appointed plastics sales engineer for the eastern division by the Drackett Products Co., Cincinnati, Ohio, and will work out of Towaco, N. J. He formerly held a similar position with Boonton Molding Co., Boonton, N. J.

Arthur M. Howald, who has been associated with the Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio, since its inception in 1930 as the Toledo Synthetic Products Co., has resigned from his position as technical director.

Deceased

Dr. J. J. Mattiello, 48, died May 16. Formerly vice-president and technical director, Hilo Varnish Corp.

Ralph E. Dorland, 68, died May 21. Formerly manager New York office, The Dow Chemical Co.

MEETINGS

August 10-13—Western Packaging Exposition and Conference on Packaging, Packing, and Shipping, Civic Auditorium, San Francisco, Cal.

August 16-17—The Plastics Committee of the Technical Association of the Pulp and Paper Industry will sponsor a two-day conference at the Institute of Paper Chemistry, Appleton, Wis.

Sept. 27-Oct. 1—Third National Plastics Exposition, Grand Central Palace, New York, N. Y.

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Classified Advertisements

For further information address Classified Advertising Dept. MODERN PLASTICS 122 East 42nd St., New York 17, N. Y.

HYDRAULIC PRESSES, 30"x52", 24" ram, 700 tons; 30" x 30", 20" ram, 1000 tons; 36" x 36", 17" ram, 340 tons; 20" x 24", 19" ram, 350 tons; 42" x 42", 16" ram, 250 tons; 36" x 36", 16" ram, 250 tons; 36" x 36", 12" ram, 141 tons; 36" x 52", 14" ram, 385 tons; 20" x 30", 15" ram, 177 tons; 20" x 20", 12" ram, 106 tons; 24" x 20", 10" ram, 118 tons; 19" x 24", 10" ram, 78 tons; 23" x 17", 8" ram, 75 tons; 22" x 15", 8" ram, 75 tons; 15" x 15", 8" ram, 75 tons; 12" x 12", 7½" ram, 50 tons; 12" x 12", 6½" ram, 42 tons; 8" x 9½", 4½" ram, 20 tons; 16" x 16", 3½" ram, 12 tons; New Dual Pumping Units; HPM Triplex 1½ GPM 2500#, Robertson Duplex 1-2/3 GPM 4000#; Worthington 2½ GPM 4000#, W&S Duplex 1 GPM 2500#, 4 plunger 6 GPM 2000#; Laboratory Presses all sizes; Laboratory Mills, New Units 6" x 12" M.D., 10" x 24" and 16" x 30", 36", 40" and 42" Mills with Drives; Extruders, Plastic; NRM 1½" and 2½" units; W&P unjacketed sigma blade 100 gal. Mixer; Preform Machines; Stokes R. Colton 5T; Hydro-Pneumatic and weighted type Accumulators, etc. HIGHEST PRICES PAID FOR YOUR USED MACHINERY. Universal Hydraulic Machinery Company, 285 Hudson St., N. Y. C. 13.

IF YOU HAVE good hydaulic presses with modern pumping equipment, send me specifications of same with photo. I will see to it that you will get the best price available. Sal's Press, 388 Warren Street, Brooklyn, N. Y.

FOR SALE—1—Watson Stillman Hydro-Pneumatic High and Low Pressure System, complete, 3000#; 12—Baker Perkins 100 gallon Plastic Mixers; 1—12" x 12" Press 7" Ram, Steel Heated Platens and Hand Pump attached; 2—24" x 24" Adamson, 10" ram, 2—opening Hydraulic Press; 2—La Pointe Hydraulic Pumps, 150 G.P.M.—2000 lb. pressure direct motor driven to 125 HP AC motors; 1—French Oil Hydropneumatic Accumulator; 1—14" x 24" Press, 9" ram; 2—Royale #3 Perfected Tubers; 1—Royale #½ Perfected Tuber; 1—16" x 42" Thropp Mill; 2—B & J #1 Rotary Cutters; 1—Cavagnaro 2 cylinder 10" diameter Vertical Hydraulic Extruder; 1—Devine #11 Vacuum Shelf Dryer, 17 shelves heated 40" x 42"; 1—Farrell 6" x 12" 2-roll Rubber Mill; 1—48" x 48" 3—opening Hydraulic Press, 4—10" diameter rams, 300 tons; Dry Powder Mixers; Pulverizers; Grinders; etc. Send for complete list. Box C581, Modern Plastics.

FOR SALE Hydro Pneumatic Accumulator, 13 Gal. 3500#. 25 Ton "C" Frame Type. High Speed Self Contained Hyd. Press Ball & Jewell Rotary Cutter. Model T Stokes Tablet Machine. 50 Ton Press with 18" x 18" Electric Plates. 100 ton 20" x 20" press. Racine Pumps, Boosters, Valves, Logan Pumps, Valves. Self-Contained—200 H.P. 75 Gal. 3000# Pump. 200 H.P. 200 Gal. 1500# Pump 18" x 15' Accumulator 1500#.—15" x 11' Acc. 400-2000". 6" x 9' Accumulator-2000#. 300 Ton Press 20" Ram, 8" Stroke, 24" x 20" Plates. 500 Ton—1000 Ton Hobbing Press—Hele Shaw Variable Pressure 33 GPM 2500#—Vickers Oil Pumps 17 GPM 500 to 1000#. Elmes Horo. 4 Plunger 6—Gals. 5000#.—Stillman 12"x12" Laboratory Presses. Aaron Machinery Co., 45 Crosby St., NYC.

FOR SALE—Compact Molds for injection molding. For molding large round compacts and other styles. Some styles with tools, puffs, sifters, cartons and parts. Will sell cheap. Affiliated Enterprises Co., 85 Van Braam St., Pittsburgh 19, Penna.

HYDRAULIC SERVICING

Hydraulic installations—repairs modifications and hydraulic power units built to specifications by hydraulic specialists.

Hydraulic Service Company of N.Y. 4317 Richardson Ave., Bronx 66, N.Y. Telephone: MUrray Hill 2-0276

WANTED: PLASTIC Scrap or Rejects in any form. Cellulose Acetate, Butyrate, Polystyrene, Acrylic, Vinyl Resin, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding and magnetizing. Reply Box 318, Modern Plastics.

FOR SALE: 500 ton Hydr. Molding Press 42" x 48"; Field 500 ton 25" x 30"; Francis 200 tons, 24" x 18"; Thropp 175 ton 36" x 36" 6 openings; also 20 to 250 tons from 12" x 12" to 36" x 36"; 40 ton Broaching Press; Watson-Stillman Hor. 4 Plgr. 1" x 2" x 4" H.&L. Pressure Pumps" HPM 1¾" x 6" vertical triplex 10 GPM 2700 lbs.; 7 Hydr. Oil Pumps, Vickers, Oilgear, Northern, etc., Elmes 1" x 4" & 1½" x 4" hor. 4 plgr. 5 to 8 GPM 4500 lbs. & 5500 lbs.; Elmes 2" x 6" hor. 30 GPM, 2500 PSI; Rumsey 4½" x 8" vert. Triplex 65 GPM 900 lbs.; Elmes 2½" x 4" hor. 17 GPM 850 lbs.; Hydr. Steam Pumps; Low Pressure Pumps 150 to 600 lbs.; Hydr. Accum; Stokes type 200-15 Ton Automatic Molding Press, Stokes Rotary Preform Tablet Machines 1-3/16", 1¼" and ⅝", also single punch; Injection Molding Machines 2 oz. to 12 oz., Thropp 16" x 36" 2 Roll Rubber Mill; Baker Perkins jacketed Mixers 200, 100, 50, 20 & 9 gals. capacity; New Rotary Cutters; Rubber Mills; Calenders, Banbury Mixers, etc.; Heavy duty Mixers; Grinders; Pulverizers; Gas Boilers etc. PARTIAL LISTING. WE BUY YOUR USED MACHINERY. STEIN EQUIPMENT CO., 90 WEST ST., NEW YORK 6, N. Y. WOrth 2-5745.

DO YOU NEED a Hydraulic Press for Compression Molding, Transfer Molding, Laminating, Forming, Bending, and Hobbing? Many sizes hydraulic presses and pumping units available. New motors from 2 to 7½ H.P., 220 volts, 3 phase. Whatever it may be, if it is hydraulic, see Sal-Press Company, 388 Warren Street, Brooklyn, N. Y.

FOR SALE—2 K. W. Thermax, high frequency heating unit, 2-10 megacycle range, a sturdy flexible unit suitable for production or experimental work. New condition, reasonably priced. Write—W. H. Hutchinson & Son, Inc., 1031 North Cicero Avenue, Chicago 51, Illinois.

WANTED

Eastern Sales Manager for large manufacturer of polyester laminations and acrylic fabrication and forming.

One of the countries largest manufacturers of polyester lamination who is also engaged in the highly-specialized field of acrylic forming and fabrication requires the services of a high-caliber man to handle sales on the Atlantic Seaboard. Experience in both lines essential.

Salary commensurate with background; plus incentives required by a man who can produce. Reply Box C 668 MODERN PLASTICS.

SALES ENGINEER—Excellent Chicago area industrial contacts and with good knowledge of plastics, desires to represent established manufacturer. Can give complete coverage of this territory either full time or as manufacturer's agent. Married. Age 31. Reply Box C 669 Modern Plastics.

MAKE MORE MONEY WITH YOUR MOLDS—French concerns will rent or buy your used molds if good—Give all information to M. C. Boss, 234 W. Dudley Avenue, Westfield, New Jersey, We 2-1691.

FOR SALE: 1—9 OUNCE HPM INJECTION MOLDING PRESS model #200, complete with hydraulic system, Wheelco control, Westinghouse transformers. Practically new standard cylinder and one NEW Hastelloy 9 ounce heating chamber. Machine subject to inspection while in production in mid-west plant. Reply Box #C670 Modern Plastics.

WANTED—INJECTION MOLDING ROOM SUPERINTENDENT. Man completely versed in managing and operating injection molding department. Must be capable getting maximum quality production, alert to efficient methods and mechanized trimming methods. Fine position right man. Operating thirteen injection presses up to 16-ounce capacities, Reply, giving complete details of experience and salary requirements, to the President, Franklin Plastics Division, Franklin, Pennsylvania.

AVAILABLE "SALESMANAGER"—Excellent record of digging where custom molding business is located, supported by actual manufacturing and general operating executive experience, which permits estimating jobs for profit and designing them within safe production limits. I am employed in the East and handle a very substantial volume of diversified business. Desire to make change. Reply Box C671 Modern Plastics.

PLASTICS FABRICATING PLANT FOR SALE in Florida's fastest growing city. Fully equipped for all fabrication-machining, extrusion, die forming, blowing, vacuum drawing, etc. Company is new and outgrowing owners time. Reason for selling business, have other professional duties. Will consider selling stock to experienced fabricator capable of "taking-over" and managing business. Reply Box C672 MODERN PLASTICS.

WANTED: SALESMAN for decorative plastic field. State details, experience, territory covered. Outstanding opportunity in non-competitive market. Commission. Reply Box C673 Modern Plastics.

FOR SALE: due to order cancellations—500 lbs RB 22 Red Gran. 1077 Melmac flo soft. Reply Box C674 Modern Plastics.

100% TRANSPARENT PLASTIC VIALS with bakelite cap or 100% transparent fountain pen barrels as container for a metal tool measuring 9/32" x 5½", Quantity required 5,000 to 10,000. Reply Box C675 Modern Plastics.

WANTED—injection machine 16 oz. Must be first class working condition. Plastic Products, Inc., 415 Lexington Ave., New York 17.

DESIGNER HAS PATENTED mechanical toys, original, new, for plastic manufacture, Sell outright or royalty basis. Reply Box C676 Modern Plastics.

WANTED
EXPERIENCED EXTRUDER REPRESENTATIVES

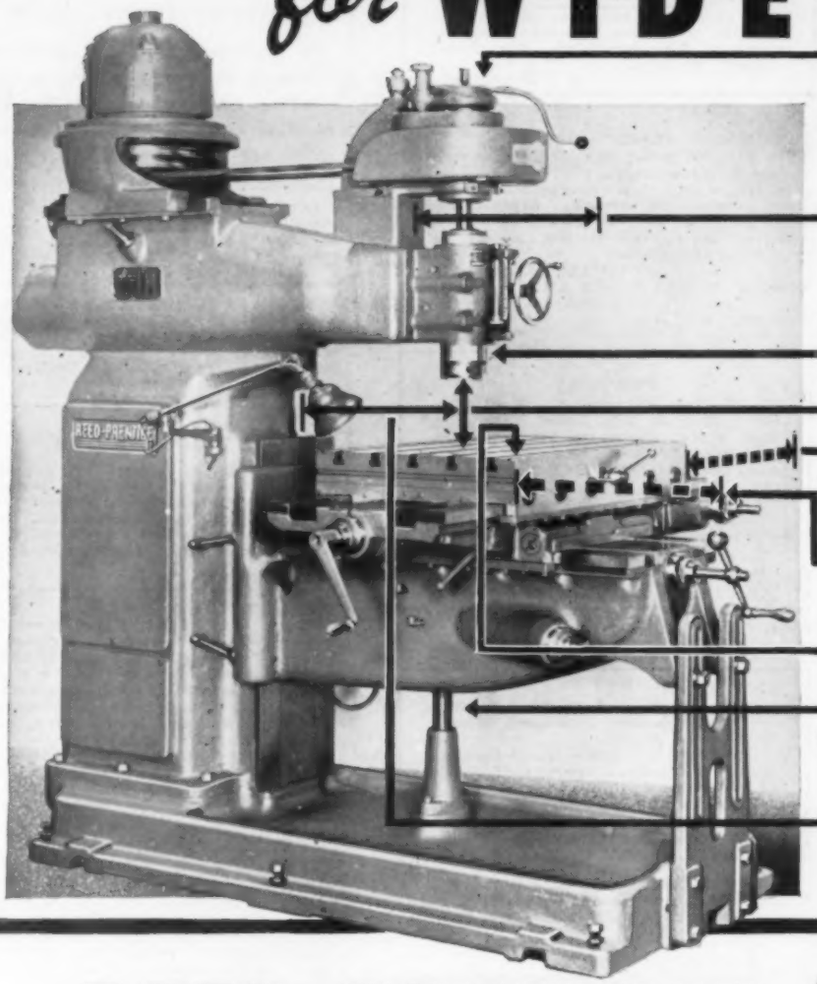
By growing, progressive manufacturer. Straight liberal commission. N. Y. C. and other territories. Allied, non-competing lines and engineering background an asset. Write in detail, confidentially, experience, established contacts, etc. Box 82, Roselle, New Jersey.

MOLDS FOR CANADA

Well rated firm interested in discontinued molds suitable for 8 oz. Reed Prentice machine. Will pay in U. S. dollars. Household items preferred. Will not interfere with your domestic market. Box No. C677 Modern Plastics.

(Please turn to page 194)

for W-I-D-E *Range...*

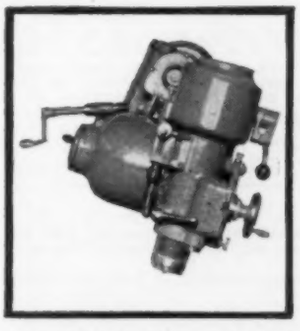


- Back gear adjustment, spindle speeds 133-2600 RPM
- Ram adjustment 16"
- Vertical travel of spindle 5"
- Maximum distance, spindle to table 20"
- Longitudinal feed 27"
- Cross feed 22"
- Table — length by width, 32"x22"
- Vertical adjustment of knee 16"
- Maximum throat depth 30"

REED-PRENTICE 22-V
Milling and Die Sinking Machine!

A heavy duty milling and die sinking machine, ideally suited for the making of rubber, plastic and ceramic molds and die casting dies as well as for general manufacturing purposes. Due to extremely rugged construction and wide range, it will handle work as large as tire molds with ease and accuracy.

This miller is also available in the 22VS model, provided with a universal head that swivels 45° front and back and 30° left and right of vertical; and on which, cross and longitudinal feeds are electronically controlled. For complete milling and die sinking machine information, write Dept. K today!



Universal head on 22VS model, swivels 30° left and right of vertical.

NEW YORK
75 West Street

CLEVELAND
1213 W. 3rd Street

MACHINE TOOLS

REED-PRENTICE CORP.

WORCESTER MASS., U.S.A.

LOS ANGELES
2314 Santa Fe Ave.

(Continued from Page 192)

PLASTIC MOLD DESIGNER WANTED—familiar with all phases of injection molding, capable of engineering and designing products and molds, estimating production and mold cost for a large manufacturing company. When replying please state all qualifications, stating age, experience, and education. Reply Box #C678 Modern Plastics.

2—Royale #3 perfected tubers.
1—Thropp 16" x 30" mill with 75 HP, AC motor.
1—Colton #5½ T single preform press.
2—Baker-Perkins 100 gal. jack, mixers.
1—#3 Banbury mixer, motor driven.

MISCELLANEOUS

Hydraulic presses, pumps, accumulators, Grinders

GILBERT KAHN EQUIPMENT CO.
75 WEST STREET, NEW YORK 6, N. Y.
DIGBY 4-8364-5-6

PLANT SUPERINTENDENT with 20 years' Supervisory and Managerial experience in cold molded and thermo-setting plastics. Experienced in compression, transfer and injection molding. College Graduate, Ch. E. degree, qualified engineer in plant layout, hydraulic and high pressure steam systems. Thorough knowledge of personnel management, estimating, mold design, molding and finishing operations, production and cost control, sales practices, etc. Invite investigation of past record. References furnished. Reply Box C679 Modern Plastics.

WANTED, 6, 8 & 12 oz. injection molding machines. Advise make, age, condition and lowest price. Box #C680 Modern Plastics.

FOR SALE 1—Banbury Mixer with 40 HP motor; 6—Hydraulic Presses Watson Stillman, Southwark 30 to 170 ton;; 3—Baker Perkins Mixers 50-100 gals.; 18 Stokes Preform Presses, single and rotary punch ⅝" to 2½"; 2—Ball & Jewell Rotary Cutters #0 and #1; Pebble Mills, Ball Mills, Rotex Screens, Kettles, Dry Powder Mixers, etc. Send for bulletin. BRILL EQUIPMENT COMPANY, 225 West 34th St., N. Y. 1, N. Y.

COMPRESSION MOLDER, capable manufacturing and distributing nationally. One piece phenolic clothes-pin, color-fast, boil proof, will not split, holds silk stocking to thick blanket. Has special patented hooks for hanging indoors in closets and outdoors on clothes-line. Conveniently, safely holds slips, skirts, children's pants, etc. Reply if interested in marketing this new invention. Box #C681 Modern Plastics.

WANTED: AGENT IN U. S. to send us a constant stream of samples of any new plastics products appearing on the American market; especially injection moulded products and articles of utility value. It is most important that these samples and ideas reach us as quickly as possible after first appearance, as tooling up takes some time and competition is intense. Write: ALFA PLASTICS LTD., 20-21 ST. DUNSTANS HILL, GREAT TOWER STREET, LONDON, E.C. 3, ENGLAND.

WANTED

Used compression presses of 100 tons or over. Box No. C682, Modern Plastics.

SMALL MOULDING SHOP WANTED

—one or two machines—four or eight ounces capacity—please state all details—answer Box C683, Modern Plastics.

WE WISH TO PURCHASE an 8 ounce injection machine in good condition, Reed Prentice, preferred, but would accept other makes in good condition. Reply Box C684, Modern Plastics.

HERE'S A REAL DEAL!

To Trade: Colton No. 5½ preform press with die and punch holders included, condition excellent (New cost over $4000.00)—For Stokes Automatic or Stokes Standard molding press of like condition. Box C685, Modern Plastics.

MFG.—HOUSEHOLD ITEM

Sales $125,000 year; can increase; approved by Good Housekeeping; over 600 accounts adv. in many top magazines; patented plastic household necessity; product assembled, no machinery required. Sell all corporation assets for $45,000, actual value. Can move anywhere.

THE APPLE CO.
Brokers 1836 Euclid Ave. Cleveland
Est. 1905

FOR SALE

1½ N. Rub. Extruder Excellent Condition. 5 H.P. D.C. Drive Motor, 7½ H.P. 4 Kw. Generator Set. 3 screws, crosshead, N.Rub. Hot Oil System and die adapters. Machine 2 years old. SANDEE MFG. CO., 5050 Foster Ave., Chicago 30.

ENGINEER, fully familiar with fabrication of TELEVISION LENSES, is needed by a compression molding company. Reply Box C687, Modern Plastics.

FOR SALE:
One 10A-2 ounce Reed-Prentice Injection Molder purchased March 1938—Price $3100.
Two 10D-6 ounce Reed-Prentice Injection Molders purchased early 1940—Price $6500.
In good working order—Inspection under operation. Reply Box C686, Modern Plastics.

WANTED, one (1) 4 ounce injection molding machine. Reply Box C689, Modern Plastics.

MANUFACTURER'S REPRESENTATIVE WANTED for newly organized injection molding factory. Will grant exclusive territory to right man with good sales organization. Reply Box C688, Modern Plastics.

TOOL DESIGNER

for plastic injection molds. Must be well experienced and familiar with modern methods. Excellent opportunity with progressive, well-established molder in metropolitan area. State details. Reply Box C690, Modern Plastics.

FOR SALE: R.C.A. Radio Frequency Generator. Type 15-B. Complete. New. Never Used. Power Output 15 Kw. 230 Volts 60 cycle 3 phase. Substantial saving. B. C. WILLS & CO., Inc., 666 East Columbia St., Detroit (1), Mich.

OUTRIGHT SALE OF PATENT RIGHTS offered on novel gripping device for cocktail stirrers. Considerable human interest value embodied in this low cost injection moulded item indicating large distribution possibilities to chain outlets. Numerous modifications possible, giving patent owner power to sell individual designs to large consumers. Johnson Development Company, 46 St. George Street, Toronto, Canada.

WANTED

SUPERINTENDENT—MOLD

To take charge of new department on profit sharing basis. Must be thoroughly experienced in design, estimating and production of Molds. Established Phila. company. All replies strictly confidential. Box Number C691, Modern Plastics.

WANTED: PROMOTER TO MANUFACTURE AND SELL a new item for the kitchen. This article will stand a thorough investigation and checking of its practicability, design and sales possibilities. Reply Box C692, Modern Plastics.

MOLDS WANTED

Interested in molds for consumer products— for 4, 9 or 16 oz. injection presses; compression—100 to 300 tons. Submit full specifications on molds for sale, prices and samples of items. Reply Box C693, Modern Plastics.

FOR SALE:
One 3,600 Ton Multi Daylight Press by Van Huilen of Krefeld having seven steam heated platens 10'-6½" x 2' 7⅛" x 2.36" thick giving six daylights each 5½". The press is of the upstroke type, having two rams each 33.8" diameter, and the ram pressure is 4,500 lbs. per sq. inch. On the above basis the pressure intensity on the platen area is 2046 lbs. per sq. inch. Complete with flexible steam connections and Centrifugal Pump for closing the Press and High Pressure Pump for giving Hydraulic Pressure. Reply: S. O. Cazaly, Room 605, 44 Whitehall Street, New York 4, N. Y.

WANTED:
PLANT SUPERINTENDENT — production expert about 40 years of age, preferably with experience in coated fabrics field and with engineering background. Know workings of incentive plans; able to handle labor relations. Base salary plus bonus. Reply Box C694, Modern Plastics.

PLASTICS PROPRIETARY MERCHANDISER

Widely experienced in product development and marketing. Well informed on plastic opportunities in merchandise field. Broad background with midwest molding organization. Now hold executive sales position but desire to make change. Replies held strictly confidential. Reply Box C695, Modern Plastics.

WANTED:
EXPERIENCED SUPERINTENDENT for small molding plant on Pacific Coast. Must be capable of handling personnel, production and injection molding. State salary expected and give full particulars on past experience and references. Prefer man between the ages of thirty five and forty five. Exceptional opportunity for the right man. Replies will be kept in the strictest confidence. Reply Box C696, Modern Plastics.

FOR SALE: PLASTIC PRESS
Baldwin Southwark 4000 Metric Ton steam heated Hydraulic Press—can be made to take boards 12'5" x 4' 1½"—capable being used for high pressure plastic moulding and panelling of all descriptions. Reply: S. O. Cazaly, Room 605, 44 Whitehall Street, New York 4, N. Y.

Mold Designer—Engineer

Moderate size plant—Western New York—Compression Molding—Custom molded special applications.

Opening for experienced plastic engineer. Prefer man late forties. Please supply full details of past experience, expected salary—first letter. Reply Box C697 Modern Plastics.

available in quantity

SANTICIZER 160

Now available for immediate shipment in tank car lots, Santicizer 160 can be profitably used in a wide variety of processes. In addition to its value as a heat-stable plasticizer for vinyl sheetings, extrusions, tubings and floor tiles, Santicizer 160 has properties of interest to manufacturers of adhesives, nitrocellulose lacquers, printing inks and molding powders.

For detailed technical information, prices and samples of Santicizer 160, write, wire or phone MONSANTO CHEMICAL COMPANY, Plasticizers and Resins Department, 1700 South Second Street, St. Louis 4, Missouri (phone: Main 4000)...or get in touch with any District Sales Office. If more convenient, simply return the handy coupon.

PROCESSING ADVANTAGES OF SANTICIZER 160

1. **Compatible with a wide variety of resins.**
2. **Makes possible faster extrusion at temperatures normally employed — existing production rates can be maintained at lower temperatures.**
3. **Imparts low burning rate, oil resistance, heat stability, light stability, abrasion resistance and permanence.**

Santicizer: Reg. U. S. Pat. Off.

District Sales Offices: New York (Plaza 9-8200), Philadelphia (Locust 4-0247), Chicago (Whitehall 6750), Boston (Liberty 2-6440), Detroit (Trinity 2-5728), Cleveland (Superior 3830), Cincinnati (Dunbar 1414), Charlotte (2-3454), Birmingham (7-0877), Houston (Capitol 6542), Akron (Hemlock 6191), Los Angeles (Michigan 6048), San Francisco (Yukon 6-6232), Seattle (Main 4203), Portland (Beacon 6740). In Canada: Monsanto (Canada) Limited, Montreal (Market 4236).

MONSANTO
CHEMICALS AND PLASTICS

MONSANTO CHEMICAL COMPANY MPO-7
Plasticizers and Resins Department
1700 South Second Street, St. Louis 4, Missouri
Send me immediately technical information and samples of Santicizer 160 for

Name Title
Company
Address
City State

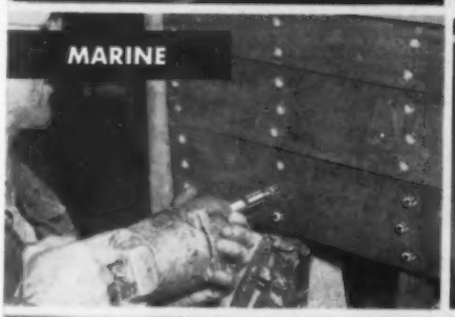
SERVING INDUSTRY...WHICH SERVES MANKIND

MODERN PLASTICS ADVERTISERS

JULY, 1948

(*Please turn to page* 198)

ONLY PHILLIPS RECESSED HEAD SCREWS

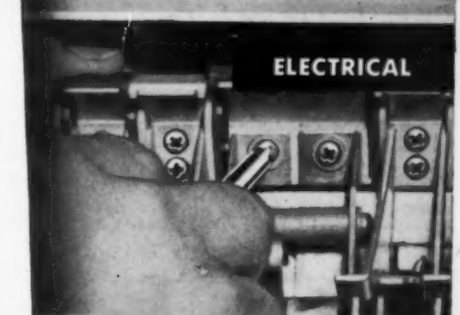


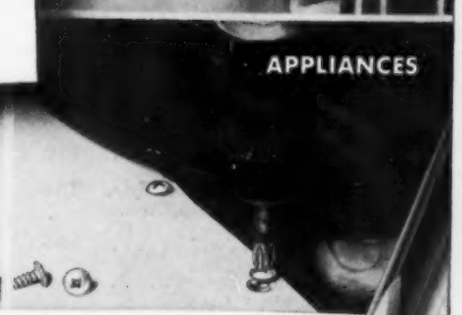
ARE ACCEPTED AS STANDARD IN ALL INDUSTRIES

One cross recessed head screw, PHILLIPS, is the accepted standard throughout industry. In the 13 years since its introduction, its many advantages have been recognized and applied in every field of manufacture.

For example, virtually the entire automobile industry has standardized on Phillips Screws—lists them in their Standards Book. Similarly, Phillips Screws are standard in most of the largest aircraft plants. Manufacturers of every type of screw-fastened assembly, large and small, use Phillips Screws exclusively.

Such universal acceptance by industry is the best possible evidence that Phillips Screws alone have *all* the qualifications essential to a *standard* cross recessed head screw. For unequalled mechanical advantages, for dependable uniformity, for unlimited supply potential, for universal acceptance, you can depend on PHILLIPS.





GET ALL THE ADVANTAGES OF ASSEMBLY WITH CROSS RECESSED HEAD SCREWS . . .

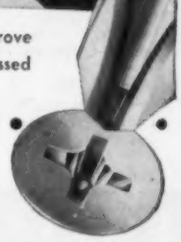
GET **PHILLIPS** *Recessed Head* **SCREWS**

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

27 SOURCES

American Screw Co.
Camcar Products Co.
Central Screw Co.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
Elco Tool & Screw Corp.
The H. M. Harper Co.
Lamson & Sessions Co.
Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Rockford Screw Products Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Seaboard Screw Corp.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wales-Beech Corp.
Wolverine Bolt Company

GET THIS NEW BOOKLET of facts that prove the top value, top economy of Phillips Recessed Head Screws. It's free . . . use the coupon.



Phillips Screw Mfrs.,
c/o Horton-Noyes Co.
1800 Industrial Trust Bldg.
Providence, R. I.

Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving".

Name_____

Company_____

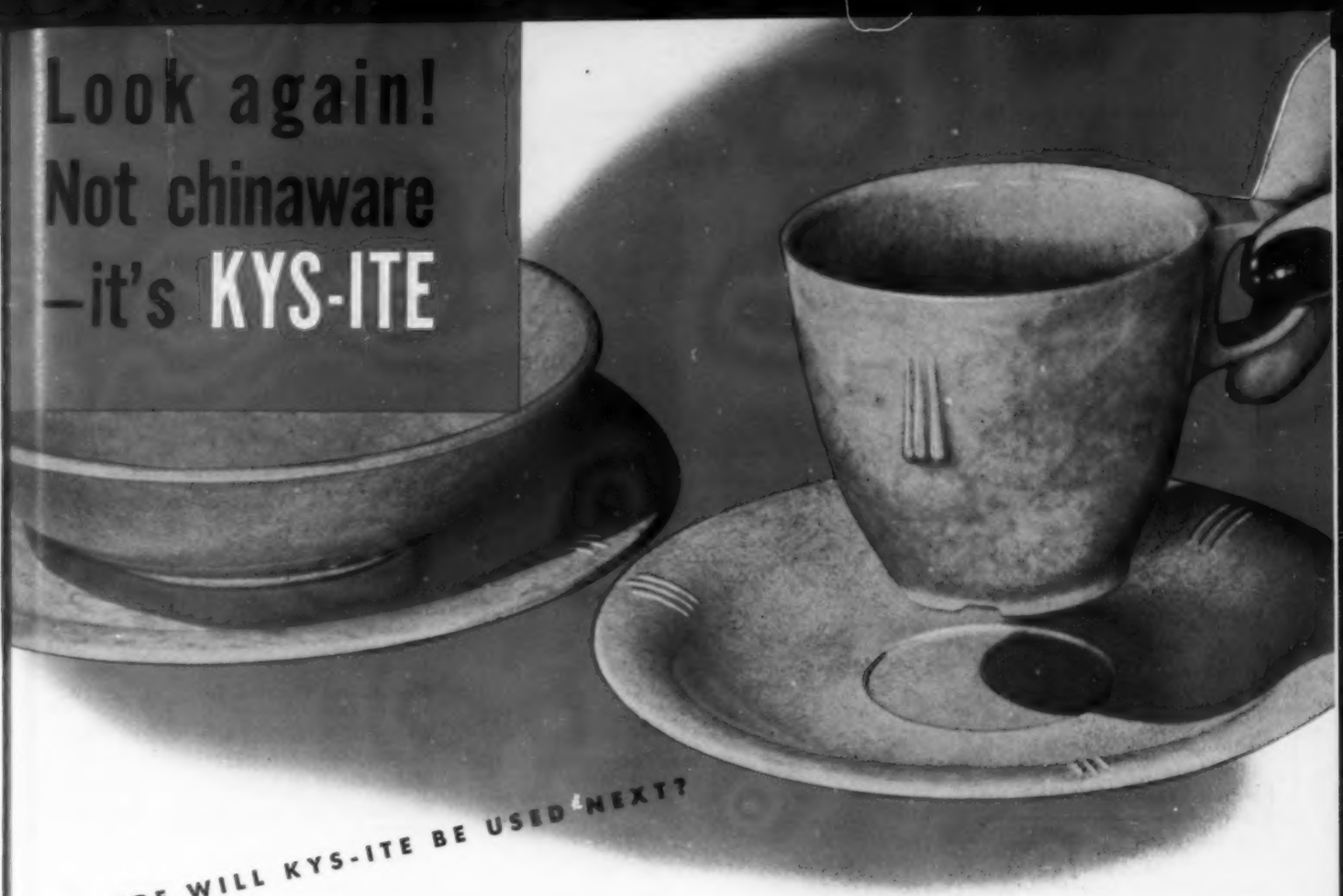
Address_____

MP-31

(Continued from page 196)

(Please turn to page 200)

Look again! Not chinaware —it's KYS-ITE



Another KYS-ITE application makes its bow! The trim lines and soft maple colorings will tell you why KYS-ITE is out front in preference when *beauty* is a product "must."

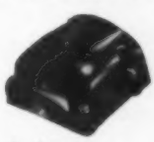
Drop or bang this tableware . . . see how it resists chipping, cracking . . . how it solves breakage problems. That's a first hand introduction to the impact strength you'll find in *any* type of KYS-ITE molded product. Another point: KYS-ITE cleans in a jiffy; and boiling water or dishwashing compounds cannot harm it.

Add the combination of properties below and you'll know why KYS-ITE is figuring in so many plans being blue-printed today. Is KYS-ITE the answer for you? Why not talk things over with Keyes development men—they're at your service any time.

BRING YOUR MOLDING PROBLEM TO KEYES

Each of these pieces makes good use of one or more of the special KYS-ITE properties—great strength and lightness, good dielectric properties, wide range of beautiful colors, unusual adaptability—a combination no other type of material can offer.

1. Sill Track (64 inches long)



2. Magneto Top Cover

3. Business Machine Housing

4. Radio Cover Assembly

KEYES FIBRE COMPANY
420 Lexington Avenue
New York 17, New York
Plant at Waterville, Maine

KEYES MOLDED PRODUCTS

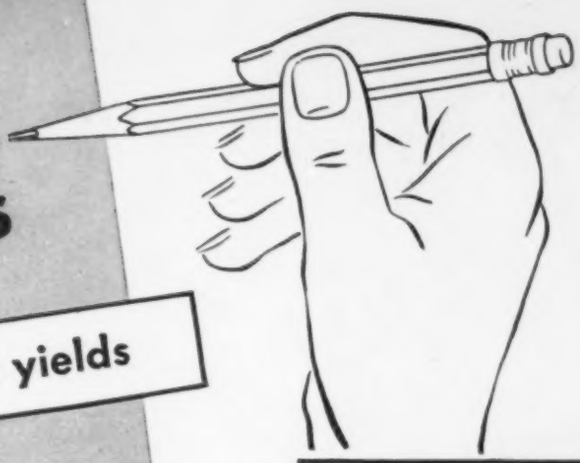
KYS-ITE
(Reg. U.S. Pat. Off.)

Preformed Plastic Combining Long-Fibered Wood Pulp and Synthetic Resin

(Continued from page 198)

FURFURAL IMPROVES PHENOLIC RESINS

and gives greater yields



Molding powders made with furfural-phenol resins give you the advantage of long flow coupled with quick and complete setting at curing temperatures. This long flow is especially advantageous to you —the molder—in forming deep draw pieces. These resins maintain their flow properties at temperatures just slightly above those required to induce plasticity, then convert rapidly when the final temperature is reached. Furfural-phenol resins are especially well adapted for transfer molding. Ask your supplier for furfural phenolics.

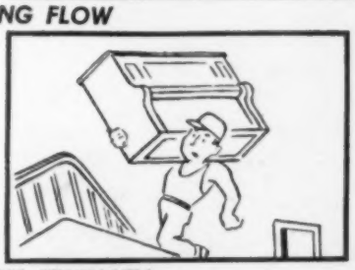
The manufacturer of resins likes furfural, too, for he can react this aldehyde with phenol speedily, thus increasing kettle output and reducing time cycles. In the formula for furfural, note the ring structure and conjugated double bonds. These offer possibilities of cure in a furfural resin, not just through the aldehyde group but also by cross linkage through the conjugated double bonds and through ring opening.

Characteristics of furfural-phenol resins also favor good surface appearance in the finished article, and the dimensional accuracy plus good electrical properties of the molded articles are also important considerations. Manufacturers of laminating varnishes like its heat resistance, electrical properties, availability and price stability.

Furfural still sells for less than ten cents a pound for the standard commercial grade having a minimum furfural content of 99½%. Availability is excellent.

The Quaker Oats Company *does not manufacture phenolic resins*, but does welcome the opportunity to supply information concerning these and other resins derived from furfural products to interested manufacturers. Write for Bulletins.

LONG FLOW



HIGH STRENGTH

GOOD ELECTRICAL PROPERTIES

HEAT RESISTANT

The Quaker Oats Company — **CHEMICALS DEPT.**

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In the United Kingdom, Quaker Oats Ltd., Southall, Middlesex, England
In Australia, Swift & Company, Pty. Ltd., Sydney
In Europe, Quaker Oats-Graanproducten N. V., Rotterdam, The Netherlands; Quaker Oats (France) S. A., 42, Rue Pasquier, Paris 8E, France

POUR OUT YOUR PLASTIC PROBLEMS TO WMP

Spilling accidents and stained hands from filling ink wells are few and far between with the introduction of the new Carter's Ink Pourout, a recent addition to our long list of custom injection plastic mouldings. Precision threaded on the inside, the Pourout screws tightly on the bottle to stop evaporation and all possibility of leakage. Day after day, Worcester Moulded meets the demands of industries of every type, for large continuous deliveries of quality plastic parts and products. Our die designers, die makers, moulders, finishers and inspectors concentrate on your problem, and on production for you as though they were your own personnel. If you are considering the use of plastics, pour out your plans to us.

Pourout courtesy Carter's Ink Company

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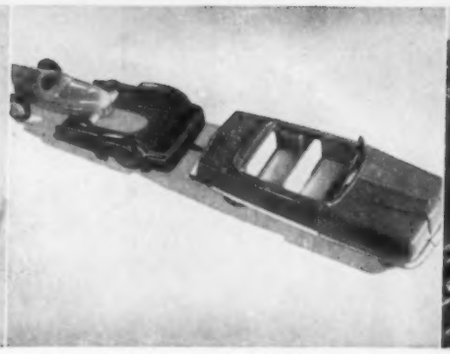
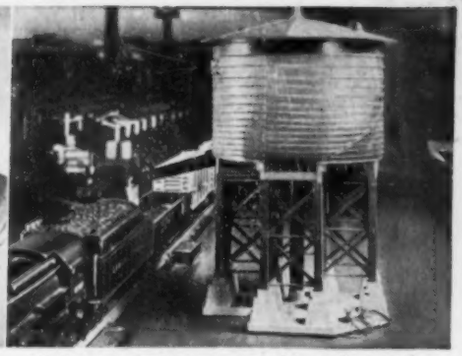
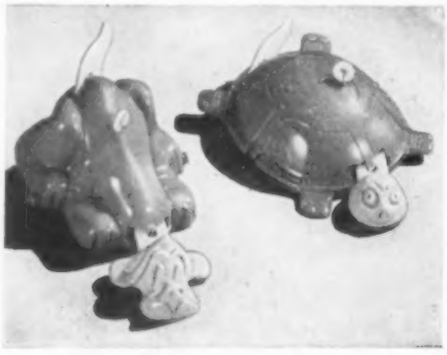
"Tomi Water Gun" by Shawnee Novelty & Mfg. Co.



"Kar King Autos" by The Glen Dimension Co.



Model Train Water Tower by Lionel Corporation

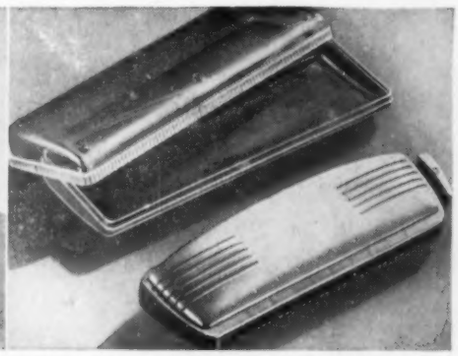


Novelty Toys by Alladin Plastics, Inc.

For Economy, Beauty, Durability...Everything That Sells Toys!

"Whirl-Drop" Toy by Commercial Plastic Co.

Accordion by Magnus Harmonica Corporation



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TRADE-MARKS

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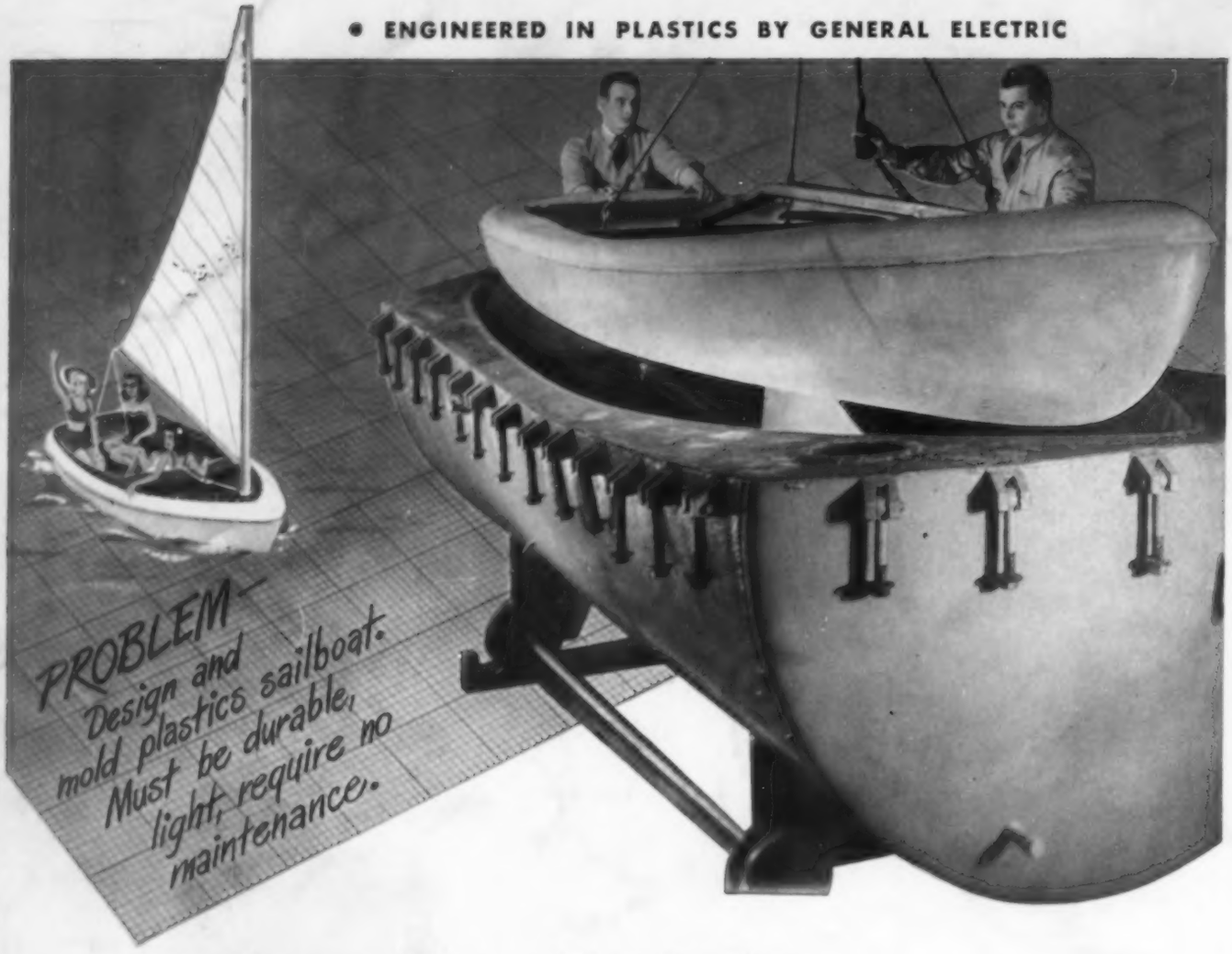
● ENGINEERED IN PLASTICS BY GENERAL ELECTRIC



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